ASPECTS OF IRON AGE ECOLOGY IN TRANSKEI

BY

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Thesis presented in partial fulfilment
of the requirements for the degree of
Master of Arts at the
University of Stellenbosch
Study Leader: Prof H.J. Deacon
January 1993

DECLARATION

I the undersigned hereby declare that the work contained in this thesis is my own original work and has not previously in its entirety or in part been submitted at any university for a degree.

in day of 30/11/92.

ABSTRACT

A palaeoecological study was initiated mainly to determine vegetation patterns in a selected area of Transkei during the Iron Age (c. 1500 – 100 BP). Data cited here support earlier contentions that the vegetation was broadly similar to the present. Modification of the vegetation, by agropastoralists, occurred where there was long term settlement. Analysis of charcoal suggests similar precipitation levels for the period AD 660 – 770 relative to the present. The paucity of early farmer settlement during the period AD 900 – 1400 is broadly contemporary with the "European Medieval Warm Epoch," suggesting that arid conditions in the interior of Transkei may have limited cultivation. The significant increase of settlement in the second half of the second millennium AD, suggests a return of higher rainfall and more productive environmental conditions. Archaeological evidence suggests that early agropastoralist settlement in Transkei was an extension of that in Natal but local variations in ceramic style and spatial organisation exists.

OPSOMMING

'n Palaeoekologiese ondersoek is geloods met die hoof oogmerk om die plantegroei patrone van geselekteerde gebiede in Transkei gedurende die Yster Tydperk (c. 1 500 – 100 BP) te bepaal. Biologiese data ondersteun vroeëre idees wat voorstel dat die plantegroei wel ooreenstemming getoon het met die huidige. Lang termyn nedersetting van agropastoraliste het egter regstreeks aanleiding gegee tot die modifikasie van plantegroei. Die analise van houtskool dui op 'n ooreenkomstige reënval syfer gedurende die periode 660 – 770 nC relatief tot die huidige. Die lae voorkoms van Yster Tydperk vindplase wat behoort tot die periode 900 – 1400 nC is breedweg kontemporêr met die "Middeleeuse Warm Epog," en stel voor dat 'n afname in somer reënval die verbouing van gewasse beperk het. Die skerp toename in nedersetting in die tweede helfte van die tweede millennium nC dui op 'n toename in somer reënval en 'n meer produktiewe omgewing. Argeologiese data stel voor dat nedersetting van vroeë agropastoraliste in Transkei 'n uitbreiding was van soortgelyke nedersetting in Natal. Plaaslike variasies in potstyle en ruimtelike organisasie kom egter voor.

ACKNOWLEDGEMENTS

I wish to express my gratitude to Dr J. E. Granger who instigated Iron Age research into the Transkei, for the description of the vegetation of the study area, and for motivation, direction and support throughout this research project. Prof H. J Deacon for his advice to sort out specific concepts, and to remove redundant sections and wordiness in the thesis. M Leslie–Brooker for her advice on grammatical and editorial aspects. Dr T. Maggs for introducing me to Early Iron Age sites in Natal and permission to study ceramics housed in the Natal Museum. Mr J. M. Feely for introducing me to the relevant archaeological sites and for general support with this study. Grateful acknowledgements to my parents for their moral and financial support with the preparation of this thesis.

I thank; S. Amann for the description of the pottery attributes; L. Allison for the identification of the seed remains; J. Brink for the identification of faunal remains; H. Lewis for the preparation of figurine drawings; K Mack for preparing the photographs; J Maritz for help with the statistics; J. Presmeg for the aerial photography of the study area; L. Scott for the preliminary analysis of pollen material; M. Schram for locating helpful references; C. Shackleton for surveying the woody vegetation of the study area; T. Strever for the sampling of vegetation in the study area; J. Vogel for providing radiocarbon dates; V. Ward for the identification of shell beads; D. Wopula for his help as an interpreter, and field and laboratory assistant.

In addition I would like to thank the following people for help and advice: S. Bell – Cross, S. G. Cawe, Z. Henderson, R. Knight, S. Shackleton, L. van Schalkwyk, G. Whitelaw, and R. Winn.

Finally, my thanks to the inhabitants of the study area for their assistance with the excavation and their friendliness and courtesy during my stay.

The research project was funded by the Research Committee, University of Transkei, the Harry Crossley Fund of the University of Stellenbosch and the Institute for Research Development, Pretoria.

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1 INTRODUCTION

"These and all other inhabitants are herdsmen and cultivators of the ground, by which means they subsist. They cultivate millet, which is white and the size of a peppercorn; it is the fruit of a plant of the size and appearance of a reed" (Lavanha 1597 in Theal 1898:91).

One of the achievements of archaeological research in South Africa has been to show the time depth of agricultural settlements along the eastern seaboard. Radiocarbon age determinations made on archaeological materials associated with farming settlements suggest that by about AD 600, if not earlier, settlements had been established in areas of the Transkei and Ciskei (Cronin 1982; Robey & Feely 1987; Maggs 1989). However, archaeological exploration, even at a reconnaissance level, is far from complete. This is shown by the recent discovery of a series of early settlements around East London (Opperman pers. comm.) and the Kei River (Binneman pers. comm.). Thus farming had been practised for almost a thousand years before Lavanha's observations were recorded at the end of the sixteenth century.

Lavanha's description and later historical observations from Transkei indicate that settlements of traditional farming communities were restricted, for the most part, to areas where summer rainfall allowed cultivation of African cultigens (Shaw & Van Warmelo 1981). The area south of Transkei has an all season rainfall with less than 200 mm of precipitation falling in summer (Humphreys 1976; Tyson 1986) and this area is marginal for traditional farming. This restricted expansion of precolonial agricultural settlements but, for almost two millennia, parts of Transkei were farmed. Farming would have had a marked impact on the environment as has been claimed for adjacent areas in Natal (Feely 1978, 1980; Hall 1981).

Documenting the accumulated effects of the activities of hoe or digging stick subsistence cultivators and of herders over two millennia in a region like Transkei is a challenging task. It is complicated by the fact that effects of human activities were compounded by changes in the environment due to natural causes, notably variation in climate. Climatic changes can explain some changes in settlement locations but there were also changes in the kinds and relative importance of different plants and animals cultivated or herded that were culturally determined. This thesis is a study in human ecology and takes up the challenge of providing information on geologically recent environmental changes that may have occurred in Transkei and on ecological changes in the middle reaches of the Mzimvubu River Valley in particular. The results are sufficient to suggest that although environmental degradation has occurred at earlier times, the progressive impacts of the last few hundred years are cause for concern.

This study was initiated in the Department of Botany in the University of the Transkei (UNITRA). The aim of the project was to investigate whether traditional early farmers, or in archaeological terminology Iron Age settlement, had played a role in the evolution of the modern vegetation mosaic of grassland, thicket and forest (*vide* Acocks 1953; Phillips 1973; Tainton 1981; White 1983). In an earlier study (Feely 1987) a survey aimed at documenting the distribution of precolonial farming settlements showed that older settlements were largely confined to wooded valleys whereas the grassy interfluves were foci for later settlement. The conclusion drawn was that the grasslands of Transkei were not the product of deforestation by agriculturalists and that their distribution was determined by edaphic factors.

In his hypothetical map of the vegetation of the eastern half of the sub-continent, Acocks (1953) indicated that grassland areas had once been wooded. In using relict patches of disjunct forest as a basis for his reconstruction Acocks, in his pre-1400 AD map, "telescoped" much of the vegetation change that had occurred since the Miocene. The grasslands of southern Africa have a long history that can be measured in millions of years as the occurrence of the bones of dedicated grazing antelope in australopithecine sites show (Brain 1981). If the vegetation mosaic is indeed ancient the question nevertheless remains what was the impact of early farming settlement on this mosaic? The present natural vegetation of Transkei has not been completely obliterated but, on the other hand, it is not "pristine." Human activities, and not merely those of early farmers, have contributed to this change as too have environmental factors.

With regard to the latter, it is too simplistic to assume that environmental conditions were constant during the last two thousand years. Such an assumption would be inconsistent with the pattern of marked global climatic fluctuations over this period that is well established at a general level (Lamb 1982). As regional climates are coupled through the global atmospheric systems past climatic changes recorded elsewhere in the southern or northern hemisphere would also have occurred in Transkei. The amplitude and direction of change may not have been the same but the changes would have been contemporary. The movement of the boundaries of the main climatic zones of southern Africa during the last two thousand years as a product of changed synoptic conditions is of particular interest as it may well have affected the demography of precolonial farmers. A concern of this thesis was to gather information on the timing and scale of climatic fluctuations during the last two thousand years and to assess the significance of these for change in Transkei environments due to natural causes. The ecological impact that early farmers had through the clearance of woody vegetation (Deacon, J. 1986) can only be evaluated against this background. This study therefore aims to contribute some high resolution palaeoenvironmental evidence for the last two millennia of interest to ecologists and archaeologists.

An early farming site on the Mzimvubu River, known as Ntsitsana, had been located by Feely (1987) and was selected for this study because of the potential for archaeological excavation suggested by the substantial exposed deposits. Through systematic excavation and the recovery of floral and faunal remains there was potential to provide environmental data from an area of Transkei for which none were available. In addition, smaller excavations were carried out at two nearby sites of later periods to allow the sequence of vegetation changes to be reconstructed.

Cultural and biological materials were retrieved from these excavations. The cultural remains were predominantly pottery but stone tools, smelter slag, pieces of daga and figurines were also found in lesser quantities. Charcoal, phytoliths, bone, shell, seeds and pollen were among the biological materials found. Through the study of these archaeological materials and especially the pottery typology it has been possible to compare Ntsitsana with like-aged sites in Transkei and in other regions of southern Africa. The typology of pottery has proved a valuable adjunct to the radiocarbon method in dating the palaeoenvironmental data.

A brief review of results of palaeoecological research into the last two thousand years in southern Africa is given in Chapter 2. Chapter 3 provides a description of the study area and the archaeological occurrences located there. The archaeological excavations and finds are described in Chapter 4. The subsequent chapters deal with the analysis of materials that serve as palaeoenvironmental indicators. A broad synthesis and interpretation of the palaeoenvironmental data is presented in Chapter 6. Chapter 7 provides the concluding discussion and recommendations for future research. This study emphasised the potential of early farming sites to provide high resolution information on palaeoenvironmental change. It is hoped that it may stimulate other studies in a similar vein.

2 STUDIES OF EARLY FARMING COMMUNITIES AND PALAEOECOLOGY

INTRODUCTION

Agriculture, including both animal husbandry and the cultivation of plants, was introduced into Africa south of the Limpopo about 2000 years ago (Maggs 1984b; Hall 1987a; Meyer 1989). It was not a local development and it appeared considerably later than it did in Africa to the north. A large scale migration of farming people (Huffman 1989a; Phillipson 1985) and/or the diffusion of agricultural knowledge followed by the introduction of domesticants (Hall 1987a, 1987b) may have been involved. As processes migration and diffusion in this context are not necessarily exclusive. Indigenous animals and plants in sub–Saharan Africa do not seem to have provided ready–made domesticants and it was a set of exotic taxa from northern Africa, including the areas adjacent to the Mediterranean and Red seas, that was assembled in southern Africa. These exotics became the economic basis for early farmers (Phillipson 1984; Deacon, J. 1986).

The herding of sheep (Klein 1986; Voigt 1987) and later cattle and goats (Voigt 1987) may have preceded crop cultivation and the establishment of fully fledged economies. However, the archaeological evidence (Deacon, J. 1986:3–19) is consistent with a precolonial agricultural settlement being established in southern Africa by 300 AD. The presumed centre of origin for this farming tradition was in the intra–lacustrine region of "East Africa." Expansion out of this centre as far afield as southern Africa was rapid and covered more than 2000 km in a few centuries (Phillipson 1985). Agriculture involved tropical African plants and its spread into southern Africa was restricted to the summer rainfall areas. The southernmost summer rainfall areas are in parts of the eastern Cape and bordering Ciskei adjacent to Transkei (Tyson 1986). These regions therefore formed the natural southernmost limits for early farmer settlement in Africa (Humphreys 1976; Maggs 1984b).

Precolonial farmers may have settled in parts of Transkei and Ciskei as early as the fifth century AD (Maggs 1984b). However, it was much later, in the beginning of the 19th century, that widespread settlement occurred in this part of the continent (Derricourt 1977; Feely 1987). The apparent lag between the initial and the later widespread settlement (Feely 1987) is surprising. Factors such as climate that may have limited the expansion of founding groups are examined in this study. The expansion of settlement in the last few centuries, however, had much to do with the introduction of crops like maize during the period of widespread settlement and this aspect is also discussed.

PALAEOENVIRONMENTAL STUDIES

Archaeological studies of deep cave fills, accumulated over many millennia, have provided the main source of information on palaeoenvironmental conditions in southern Africa in the human period. A notable example is Boomplaas Cave (Deacon et al. 1983; Deacon et al. 1984; Deacon & Lancaster 1988) that preserves a record of changes in climate, fauna, and flora for the Holocene and much of the Late Pleistocene, broadly the last 80 000 years. The temporal resolution of the palaeoenvironmental data is at best on a millennial scale. While such a degree of resolution is adequate when the interest is in ecological changes that may have occurred between glacial and interglacial cycles it is too coarse to be pertinent in studies covering the last two thousand years. Studies on the ecology of early farmer communities require palaeoenvironmental data that has a resolution on centennial and decadal scales.

There are limited data available on palaeoenvironments of the last 2000 years in southern Africa (Deacon & Lancaster 1988). These data, from sedimentological, floral and faunal analyses (Table 1), are from discrete rather than sequential observations and come from widely separated locations. These data are also variable in quality and are qualitative rather than quantitative. Little data are from Transkei or the adjacent parts of Natal. Hence this thesis provides some new palaeoenvironmental data for this region.

Table 1. List of sites with evidence for palaeoclimatic conditions during the last 2000 years in southern Africa. Only the data from areas settled by early farmers, the summer rainfall areas of southern Africa, are listed here (sources Tyson 1986; Avery 1987; Deacon & Lancaster 1988; Plug 1989a, 1989b)

Ecozone	Site	Years BP	Palaeoclimate	Source	References
Basutolian	Alexanders-fontein	1555	wetter	sediment	Butzer *et al.*
		1395	wetter	sediment	1973, 1978, 1979,
		805	drier	horn core	Butzer 1984
Basutolian	Colwinton	1890	wetter trend	charcoal	Tusenius 1986
Basutolian	Craigrossie	570	wet	pollen	Scott 1986
Basutolian	Rose Cottage	1100	wetter	cave sediment	Butzer 1984
Basutolian	Voigtspoort	1220	drier	pollen	Horowitz *et al.* 1978

Transvaal	Jubilee	1350	rainfall reliability	micro-fauna	Avery 1987
		1000	harsher conditions	micro-fauna	Avery 1987
Transvaal	Rietvlei R4	1290	as at present	pollen	Scott & Vogel 1983
Transvaal	Morletta	440	slightly drier	pollen	Scott 1984a, 1984b
Transvaal	Tsh 1	1440	possible wetter	fauna	Plug 1989a, 1989b
Transvaal	Wonderkrater	1030	dry	pollen	Scott 1982
Kalahari	Auob	±2000 ±1000	wetter wetter	molusca molusca	Heine 1982
Kalahari	Gaap	1375	wetter	tufa deposit	Butzer et al. 1978
		1205	wetter	"	
		1070	wetter	"	
		515	wetter	"	
Kalahari	Makgadigadi Basin	±2000	wetter	lake levels	Cooke 1984, Cooke & Verstappen 1984
Kalahari	northwest Botswana	±1000	wetter		Shaw 1985
Kalahari	Kwihabe Cave	22[illegible]0	wetter	cave sinter	Cooke 1984
		750	wetter	cave sinter	
Kalahari	Wonderwerk	1210	as at present	micro-fauna & pollen	Avery 1981; Beaumont et al. 1984, Van Zinderen Bakker 1982

Time series analysis of meteorological records (Tyson et al. 1975; Tyson 1986; Preston-Whyte & Tyson 1988) has indicated that a 16–20 year cycle of wet and dry periods is a characteristic of the period of metereological records in South Africa. The extent to which such cycles can be assumed to have occurred in the last 2000 years is open to question. However, there is the suggestion that the imprint of these cycles over the last 600 years is reflected in the growth rings of a section of *Podocarpus falcatus* from Natal (Hall 1976; 1981). Although dendrochronological studies offer the kind of resolution required for the understanding of climatic variability during the last 2000 years, most indigenous tree species are unsuitable for study. The reason is that ring formation, in the less markedly seasonal climates of southern Africa, is more dependent on precipitation than temperature. Tree rings are not necessarily annular. Without the aid of dendroclimatology it has thus proved difficult to evaluate climatic variability on a decadal scale.

EARLY FARMERS AND ENVIRONMENTAL CONSIDERATIONS

Although detailed palaeoenvironmental data for the last two millennia are few, environmental factors have been assumed to be important in determining patterns of earl farming settlement. The role of environmental factors are extensively discussed in the literature. Authors have stressed the importance of the limitations posed by the climate related distribution of tsetse fly on livestock herding as a determinant of the areas settled (Summers 1967; Plug 1989a). The southernmost limit of early farming settlement in southern Africa has been correlated with the summer rainfall isohyets that limit the cultivation of crops like sorghum and other staples (Humphreys 1976; Maggs 1980a). The preferential location of sites in particular vegetation zones that allowed the practice of herding, cultivation and metal working is a recurrent theme in the literature (Maggs 1980a, 1989; Hall 1981, 1987a; Feely 1987).

In southern Africa there seems to have been a clear pattern of the preferred location of early farming settlement (Maggs 1980a, 1984c, 1989). The majority of farming sites, predating AD 1000 south of the Phongola river, are found below the 1000 m contour. They are made up of coastal sites associated with shell middens in the dune forest belt and habitations in the bottom of incised wooded valleys of rivers flowing to the coast. These locations contrast with sites on hilltops, often with stone walling, that mark the pattern of preferred settlement location developed during the beginning of the second millennium AD. Sites belonging to this latter period occur characteristically east of the 400 mm rainfall isohyet on hilltop, on hillslope, and in valley positions (Maggs 1984b). The location of some sites in eastern Transvaal and Natal appears to have been related to the availability of specific resources like metal ore (Van der Merwe & Killick 1979; Maggs 1984c). This indicates a measure of specialisation. Pastoralists occupied the drier western areas whereas those involved in the cultivation of crops needed reliable summer rainfall and metalworkers needed sources of both ore and wood for the production of metal (Deacon, J. 1986). Possibly the most significant change in settlement location pattern to have occurred during the second millennium AD was the expansion of settlement into the grassland areas and this may have been stimulated by the introduction of maize (Huffman 1986).

While archaeologists have been mainly concerned with the environmental factors underlying settlement location, ecologists have speculated that precolonial farming activities had a severe impact on the environment (Macdonald 1989). Settlements of the first millennium AD ranged in size from eight hectares to as many as 25 hectares (Maggs 1984c; Mason 1986) and settlement size alone indicates there was large scale forest and bush clearance by the early farmers. The possible extensive clearance of woody vegetation that accompanied farming and metal working activities has been noted in a number of publications (Hall 1981; Maggs 1984c; Deacon J 1986; Avery 1987; Feely 1987; Hall

1987a, 1987b; Scott 1987) but such clearance is difficult to quantify in objective terms. Changes in land use and the growth of human population have been seen as being responsible for environmental degradation in some areas (Summers 1958; Marker & Evers 1976; Collett 1979). The low archaeological visibility of sites belonging to the Ntshekane phase dating to about AD 900 in Natal (Maggs 1984a, 1984b; Maggs & Michael 1976) and the later decline of the Toutswe group of settlements in Botswana (Denbow 1981, 1982, 1984) and the Mapungubwe group of settlements in nortnern Transvaal (Voigt 1983; Plug & Voigt 1985) have been considered to relate to environmental deterioration caused by overgrazing and overexploitation of other primary resources. The viewpoints of these authors is that precolonial farming was not an environmentally benign activity.

Although changes in the demography of early farmers have been considered in a number of studies (Huffman 1978, 1991; Maggs 1989; Meyer 1989), the role that changes in climate during the last 2000 years played in limiting the dispersal and the density of population may have been underestimated. A few researchers, however, have been bold enough to suggest that changes in climates had a major impact on settlement patterns (Denbow 1986; Mason 1988; Plug 1989a, 1989b).

DISCUSSION

Since the inception of studies of early farming communities, a continuing concern has been the search for a firm chronology and an accepted artefact sequence based on ceramic form and decoration. The typological sequences that have been defined, have encouraged postulations of a sequence of population movements and diffusions through time (Hall

1987a). These interpretations have formed a component of a culture historical approach that has characterised a large percentage of the pioneering research. The definition of sequences of pottery wares, the reconstruction of migration patterns, the correlation between archaeological data and the ethnic history of Bantu-speaking groups, the interpretation of the early farming "packet of traits", and the identification of settlement patterns, technology and economy of particular "cultures" are the concerns of this approach. An outgrowth of such research has been to seek another level of explanations for settlement patterns through reference to ecological conditions as a factor (Summers 1967; Hall 1981; Maggs 1984a). Such explanations have validity but not necessarily at the primary causal level and it would be reductionist to dismiss such ecological explanations as deterministic. Another outgrowth of the cultural historical approach has been the search for the cognitive systems underlying changes or differences in settlement patterns (Huffman 1986). Such studies rely heavily on the use of ethnographic data and ecological factors are of lesser significance. More recently, in line with trends in the discipline, neo-Marxist models of historical materialism and critical theory have become the vogue in studies of food producers (Hall 1986; 1987b, Kinahan 1991; van Schalkwyk 1991). The emphasis on technology, economy, demography as well as the environment, all aspects of the human existence that survive in the archaeological record make Marxist materialism strongly environmentally orientated. As precolonial farming societies in southern Africa were relatively isolated and trade routes were long they were forced to be self-reliant. A consequence is that the environmental conditions were an important constraint on wellbeing. For this reason in all attempts to understand the past of early farming communities ecological considerations have a place. Explanations, irrespective of the theoretical framework in which they are cast, will be better for having available good palaeoenvironmental information.

SUMMARY

Studies of early farmer settlements are not supported by high resolution data on the palaeoenvironments of the last 2000 years. Nonetheless, environmental factors have been invoked to explain the preferential location of settlements and changes in the distribution and density of precolonial farmers. Such explanations rest as much on assumptions of what environments were like as on hard evidence. There is a need to improve the palaeoenvironmental data available and this thesis aims at providing some data in one region of early farmer settlement.

3 SETTING AND SITES

LOCATION

The study area (29° 12'E : 31° 04'S) is in the middle reaches of the Mzimvubu River at an altitude of 500 m.a.s.l and approximately 70 km west from the sea. It is referred to as Cweraland (Jackson 1975) because the majority of the peopie are amaCwera. Cweraland is part of the larger unit known as Eastern Mpondoland. Feely (1987) carried out an archaeological survey in three topographically distinct regions in the Mzimvubu drainage basin (Granger et al. 1985). The research described in this thesis was carried out within the region designated 2B. It is near to the Sipetu village and hospital in the Tabankulu district (Fig. 1).

GEOLOGY, GEOMORPHOLOGY AND SOILS

The dominant topographic feature in Transkei is the Post-African 1 surface (Partridge and Maud 1987; Moon & Dardis 1988) which is deeply entrenched by the Mzimvubu River (Kruger 1983; Feely 1987). In places the Mzimvubu Valley is canyon-like and access difficult. Along the meanders of the river, bodies of alluvium are stored within the channel. These patches of alluvium were particularly important for early agricultural settlement but, under the current stream flow regime, they are being eroded.

Rocks belonging to the Beaufort Group underlie the area. These are mudstones and sandstones laid down in pre-Jurassic times by streams that meandered across muddy plains

(Karpeta & Johnson 1979). Karoo dolerite intrusions occur and are associated with outcrops of contact metamorphic hornfels (lydianite). Calcareous spring tufas (travertines) are found in some of the tributary streams of the Mzimvubu River (King 1978, 1982; McKenzie 1984a; Feely 1987).

Soil maps prepared by Wood & van Schoor (1976) indicate that duplex soils with diagnostic cutanic B horizons belonging to the Kroonstad and Cartreff forms predominate on the interfluves. These duplex soils are prone to accelerated gully erosion. In the aggraded alluvium and colluvium of the valley floor there are weakly developed soils of the Dundee form. On the steeper slopes of the valley lithosols and soils of the Mispah and Glenrosa forms are found. The distribution of duplex soils is strongly correlated with the distribution of grassland vegetation on the interfluves. Duplex soils are important in the modern maize cultivation regime. The alluvial soils were the focus of Early Iron Age settlement possibly because of better soil moisture retention properties and ease of cultivation. Edaphic factors were one of the important constraints on settlement. Another was climate.

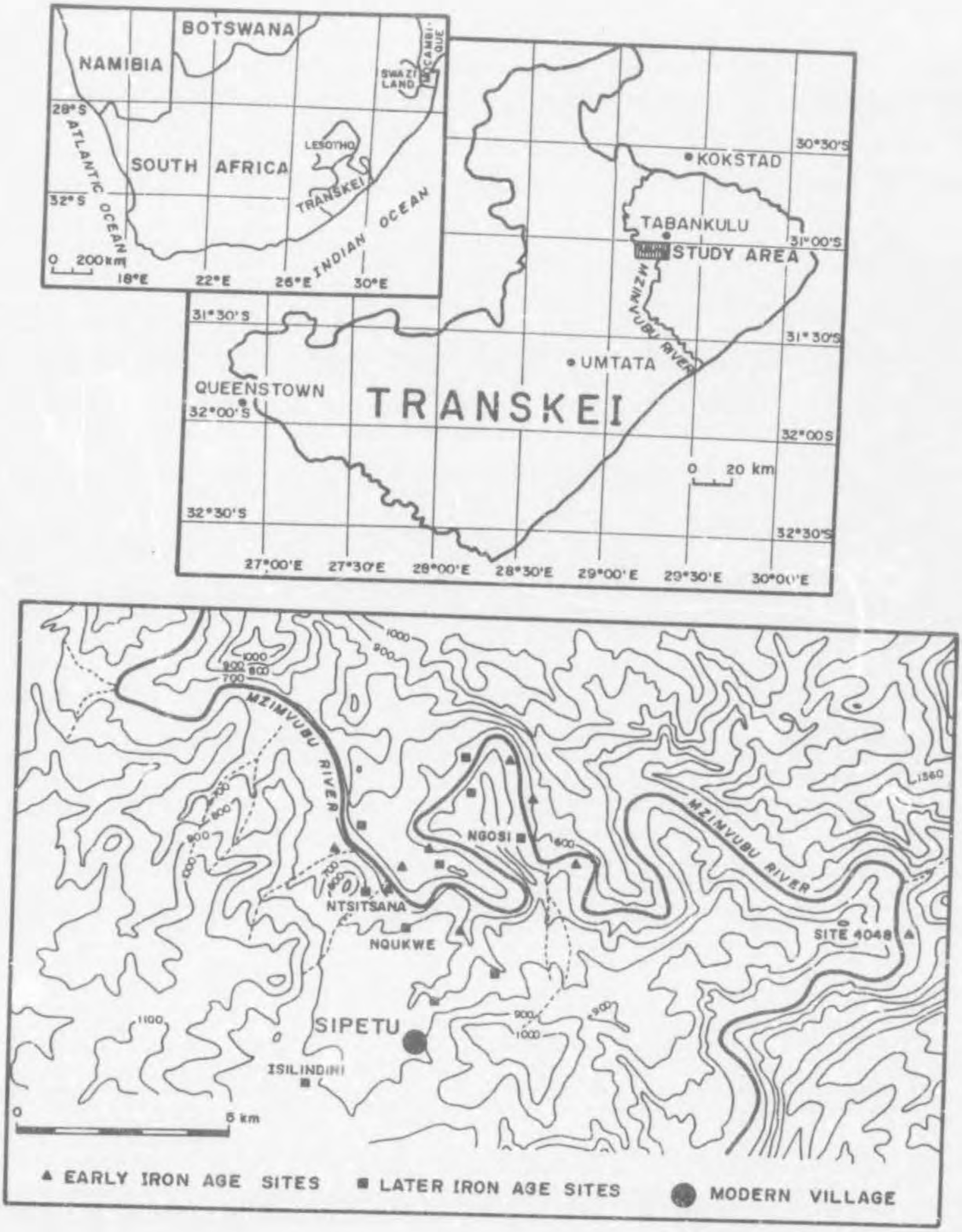


FIG. 1 MAP OF THE STUDY AREA AND DISTRIBUTION OF THE KNOWN EARLY FARMING SITES

CLIMATE

In the Köppen classification system of climate, the study area falls in a CFB–zone (Schultze & McGee 1978:39). This implies a temperate climate with dry winter seasons. Summers are moist and warm. In the Thornthwaite system the climate of the area is classified as cool–temperate mesothermic with surplus water during the summer. Although the mean minimum temperature for the coldest month may be below freezing (0° to –5° C) the climate is not extreme or continental (Schulze & McGee 1978:45).

RAINFALL

The inland areas of Transkei receive more than 80 % of normal annual rainfall in summer (October and March) (Tyson 1986:2). Rain occurs on an average of 120 days per year (Tyson 1986:4). Rainfall records (Weather Bureau 1972), show that the Tabankulu District receives an average rainfall of 820 mm per year. In Transkei, weather stations are often sited in the higher rainfall upland areas and tend to overestimate local averages. The rain gauges closest to the study area are in the Papane Plantation (1250 m.a.s.l) and the Gomo Forest Plantation (1590 m.a.s.l). These stations record average rainfall figures of 731 mm and 1180 mm per year respectively (Shone 1985:9). The values indicate that there are marked differences in precipitation depending on aspect and relief. Precipitation on the interfluves is higher than at locations within the deeply entrenched large river valleys like the Mzimvubu (Feely 1987). Shone (1985:12) gives rainfall values of between 500 mm and 900 mm per annum for the incised valleys. This range is lower than the 700 mm to 1000 mm per annum McKenzie (1984a) indicated for the ridges above the valleys. It has been the experience of modern farmers that sorghum can be relied on to produce better crops than maize where precipitation is low and uncertain (Leppan & Bosman 1923). It has been suggested (Maggs 1984c) that the relatively lower rainfall in valley bottom situations in Natal was not a limiting factor for the cultivation of crops like sorghum. Less drought resistant cereals like maize (*Zea mays*), introduced in the second half of the present millennium (Deacon, J. 1986), are cultivated mainly on the interfluves where precipitation is higher (see also Hedges 1978). The relationship between the crops grown and the location of settlements is explored in this thesis.

TEMPERATURE

Temperatures are influenced by the surface configuration and, in areas of diverse relief like the study area, katabatic flow and local winds. The latter can cause rapid and large scale temperature variations over short distances (Tyson 1986). Local effects are superimposed on a general pattern of steep temperature gradients between the coast and inland (Tyson 1986). The surrounds of the mid-valley sections of rivers like the Mzimvubu are significantly cooler than the Coastal Plateau. Shone (1985:11) gives values of 18°–22° C and 11°–14° C for the mean summer and winter temperatures at the coast. Inland, this range is greater with winter temperatures falling below 0°C at night. Frost is not a factor in the bottom of the valleys in the middle reaches because these are significantly warmer than the interfluves (McKenzie 1984a; Shone 1985). Frost in addition to low precipitation could have restricted Early Iron Age cultivation to valley bottom situations as sorghum is extremely sensitive to frost (Leppan & Bosman 1923:114).

FAUNA

Historical sources indicate that large and small game were abundant in the general area of the Mzimvubu River. These sources refer to animals that were found in Mpondoland (the adjoining area to the east), and Griqualand East (to the west and north west of the study area). It can be assumed that the species recorded were widespread.

Large mammals indicating wooded habitats included elephant (*Loxodonta africana*), possibly black rhinoceros (*Diceros bicornis*), buffalo (*Syncerus caffer*), bushpig (*Potamochoerus porcus*) and bushbuck (*Tragelaphus scriptus*). Smaller mammals identified were klipspringer (*Oreotragus oreotragus*), grey duiker (*Sylvica pragrimmia*), and blue duiker (*Philantomba monticola*) (Barrow 1804; Steedman 1835; Schunke 1893; Hewitt 1931; Holt 1959; Rochlin 1961; Macquarrie 1962; Skead 1987). Species with a wide distribution and observed by a number of early travellers included red hartebeest (*Alcelaphus buselaphus*), eland (*Taurotragus oryx*), and reedbuck (*Redunca arundinum*) (Butler 1841; Dower 1902; Hook 1907; Cory 1926; Hattersley 1945; Kirby 1955; Skead 1987). Mzimvubu means "the home of the hippopotamus" and the river supported a large population of hippopotami (*Hippopotamus amphibius*) (Steedman 1835; Skead 1987; Coulter 1988).

Records of grassland fauna are mostly from East Griqualand or the region near modern Queenstown. The plains game observed were blesbok (*Damaliscus dorcas phillipsi*) and black wildebeest (*Connochaetes gnou*), while springbok (*Antidorcas marsupialis*) and quagga (*Equus quagga quagga*) were more common in the west (Feely 1989). The widespread occurrence of mountain reedbuck (*Redunca fulvorufula*), grey rhebuck (*Pelea capreolus*), and oribi (*Ourebia ourebi*) is also an indication of the availability of grazing (Gardiner 1836; Hook 1907; Macquarrie 1962; Skead 1987).

There is reference to predators such as brown hyena (*Hyaena brunnea*), wild dog (*Lycaon pictus*), leopard (*Panthera pardus*), and lion (*Panthera leo*) in the literature (Shaw 1860; Schunke 1893; Henkel 1903; Kingon 1916; Brownlee 1923; Macquarrie 1962; Skead 1987). The black-backed jackal (*Canis mesomelas*) still occurs in the area and there may also be a small population of leopards.

Historical sources therefore indicate that prior to the introduction of firearms and hunting for the skin trade there were large resident populations of browsers and grazers in the habitats found along the river. Plains game migrated seasonally from the interior plateau to the interfluves (Skead 1987). The early farmers would have supplemented their protein supply by hunting. We also know that Bushmen groups traded meat and other animal products with early Transkei farmers (Lister 1949; Vinnicombe 1976; Shaw & van Warmelo 1981). Traditionally, tribal chiefs claimed exclusive rights to hunting, particularly in the forests, and they allowed no intrusion into their preserves without permission (Beinart 1980; Peires 1981). The extension of colonial rule and the reduction of the power of traditional rulers meant that the conservation of the indigenous fauna suffered. With guns freely available and a market for skins and ivory depletion of the fauna was inevitable.

VEGETATION

Acocks (1953) has made the only general survey of the vegetation of Transkei and frequent reference is made to it. Other useful but less relevant sources are White (1983) and Rutherford & Westfall (1986). A brief description of the vegetation of the study area is given below.

McKenzie (1984a) has shown that there is a good correlation between vegetation and terrain morphological units defined in terms of aspect, slope, and soil type. The Mzimvubu Valley is dominated by Valley Bushveld (Acocks Veld Type 23). This vegetation can be described as a scrub forest or dense savanna. Where settlement, agricultural fields, and heavy browsing by livestock have taken place, the vegetation canopy is open. In the upper reaches of the valley, scrub forest is replaced by grasslands known as Southern Tall Grassveld (Veld type 65). In the Acocks scheme Southern Tall Grassveld can be regarded as transitional between Valley Bushveld and Döhne Sourveld. On well drained valley slopes the most important woody element in the Southern Tall Grassveld is *Acacia karroo*. Döhne Sourveld is found on the flanks of the Mzimvubu River Valley and is dominated by grasses like *Themeda triandra*. Th basal plant cover is higher and it is more resiliant than Southern Tall Grassveld. The agricultural potential of Döhne Sourveld is good. Patches of forest and other woodland plant formations are found in sheltered localities on steep slopes and in isolated uplands in this grassland (McKenzie 1984a; Feely 1987). All these vegetation types are found within a relatively small area and given their different agricultural potentials, the environment is well suited to mixed farming.

ARCHAEOLOGICAL OCCURRENCES

Feely (1987) mapped 16 Iron Age sites in the middle reaches of the Mzimvubu River. Further reconnaissance in the course of this investigation has located an additional 16 archaeological sites, not all of which are Iron Age. All these sites, including those found by Feely (1987) can be classified into the broad categories used by Feely (ibid), namely Earlier Stone Age (1), Middle Stone Age (2), Early Iron Age (14) and Later Iron Age (15). There is a stone artefact component associated with six of the Early Iron Age and three of the Later Iron Age sites.

The Earlier Stone Age site, five of the Later Iron Age sites and one Earlier Iron Age site occur on moderate to steep slopes and minor hilltops (*vide* Feely 1987). Four of the Later Iron Age sites are situated on gently sloping surfaces while the remaining sites occur on alluvial terraces in the valley bottom (Fig. 1). The Stone Age sites are not relevant to this project hence they are neither illustrated or discussed further.

The distribution of the Iron Age sites is similar to that recorded by Feely (1987) throughout Transkei. It also conforms to the pattern of site distribution found in Natal (Maggs 1984a, 1984b). Additionally it was noted that the material culture, in particular the pottery, of the Early Iron Age sites in Transkei and Natal belong to the same tradition (Robey & Feely 1987). Therefore similar environmental and cultural constraints were probably involved in both Natal and Transkei.

Later Iron Age sites are readily identified by their association with distinctive pottery. Entrenched valleys appear to have continued to be preferred locations for farming settlement, although settlements also expanded up the grassy flanks of valleys. This pattern of settlement location is traditional among the modern communities that live along the Mzimvubu River like the Bhaca (Hammond-Tooke 1962) and the Mpondo (Hunter 1936; Beinart 1980, 1982). Feely (1987) recorded a higher density of early farming sites along the middle reaches of the Mzimvubu River than elsewhere in Transkei. This survey, supplemented by the results of subsequent recconnaisance trips, has indicated that the second millennium farming site density is 1.6 per km^2 whilst the first millennium farming site density is 1.7 per km^2 (*vide* Feely 1987). It appears that first millennium farming sites (Maggs 1984b) tend to be more widely spaced in Natal than in the Mzimvubu Valley. The area covered by potsherds can be used as a measure of the size of the first millennium farming settlements. Sheet erosion has exposed the full extent of two sites with site 4058 covering an area of 25 hectares while site 6002 extends over an area of 22 hectares. This is considerably larger than the 7.6 hectares typical for sites of the same period in Natal (Maggs & Ward 1984:105). However, more extensive reconnaissance is necessitated before these differences can be adequately explained.

SUMMARY

The study area is in the middle reaches of the Mzimvubu River where the river cuts through the Beaufort Group rocks of the Coastal Plateau. Duplex soils, prone to accelerated gully erosion, are dominant. Eighty percent of the annual rainfall falls in summer and there are marked rainfall gradients related to aspect and relief. High temperatures and low rainfall are features of the main valley, the focus of early settlement. The indigenous large mammal fauna has been depleted and the natural vegetation cover attenuated by farming. Three of Acocks' veld types are found in the area namely Valley Bushveld, Southern Tall Grassveld, and Döhne Sourveld. Archaeological occurrences include Stone Age and precolonial farming sites. The first millennium farming sites are located in valley bottom situations in association with deposits of overbank alluvium in the main. Second millennium farming sites extend up the valley slopes and are found on the interfluves. In part this settlement pattern reflects a change in the types of cereal crops cultivated. The introduction of maize in later times allowed farmers to build settlements on the higher rainfall areas of the interfluves. Settlement in the Mzimvubu River Valley is similar to that recorded in other areas of Transkei and Natal.

4 IRON AGE SETTLEMENT IN THE STUDY AREA

INTRODUCTION

An initial task was the selection of early farming sites with potential for excavation that could provide palaeoecological data. The site survey made by Feely (1987) was a useful guide to areas which had the most potential. A kraal, hut floors and pit structures were visible in the surface exposures on Site 4058 and so this site had obvious potential for study. It was chosen as the main focus for field work. There were other like-aged as well as more recent sites in the immediate vicinity for comparative studies. Limited excavation was carried out at two other farming settleme[illegible]unger age. A description of the excavations and the archaeological finds is given in this chapter. The palaeoecological data are discussed in Chapters 5 and 6.

NTSITSANA FIRST MILLENNIUM FARMING SITE

INTRODUCTION

Ntsitsana is a first millennium farming site located on alluvial flats on the outer bend of a meander of the Mzimvubu River (31° 04'E and 29° 12'S; Fig. 1). Surface scatters of potsherds indicated that the site belonged to the oldest known phase of farming settlement in Transkei. The main purpose in excavating the site was to document the initial impact of farming on the local environment and the site has produced valuable palaeoecological and archaeological information.

FIELDWORK : MAPPING AND EXCAVATION

The Department of Surveying and Mapping of the University of Natal photographed the area in panchromatic black and white film, at scales of 1:4000 and 1:10 000. These aerial photographs served as the basic tool for detailed mapping of this and the other archaeological sites as well as for the study of the modern vegetation in the surrounds. A ground survey and the 1:4000 aerial photographs served as the basis for the preparation of a site plan for Ntsitsana (Fig. 2). The site, delimited by the surface scatter of potsherds, was mapped using a two tier grid system of a 40 x 40 m grid within which a 2 x 2 m grid was laid out. Reference points on the larger grid were marked by painting large white crosses on stones for aerial recognition. The following features were located and investigated.

PITS

A cluster of pits each about a metre in diameter and filled with soil and domestic waste was mapped in the central section of the grid (Fig. 2). Such features are commonly recorded on farming sites and have been referred to as "ritual" (Mason 1986) or "rubbish" pits (Maggs 1984a, 1984b, 1984c). They are probably grain storage pits. This cluster of pits was exposed in and on the sides of an erosion gully. The occurrence of pits in this area seems to have promoted gully formation probably because pit fill is less compacted than the surrounding ground. Some of the pits have been largely destroyed by the erosion. The pits that were less eroded and retained deeper fill were excavated. All the pits with the exception of Pit 3 were sampled in spits of 50 mm.

Pit 1 showed simple stratigraphy. It was only 600 mm deep at its maximum depth. The lower portion of the pit (600 – 200 mm) consisted of a dark brown soil. Items found included potsherds, faunal remains, hornfels flakes, an upper grindstone, and two almost complete pots from which the bases had been removed prior to burial. The upper portion of the pit (0 – 200 mm) consisted of almost pure ash and apart from a few potsherds contained little cultural material. The ashy fill was richer in charcoal than the underlying dark brown soil.

Pit 2 showed a more complex stratigraphy and five discrete layers could be distinguished. The upper portion (0 – 300 mm) was an ashy layer containing potsherds, faunal remains and charcoal. This ash layer covered a red brown soil layer 200 mm thick from which potsherds, faunal remains, seeds, a piece of smelter slag and a complete miniature pot were recovered. A second ashy layer occurred below the red brown soil, 500 – 550 mm below the surface, and included a piece of slag, one upper grindstone and potsherds. Below this ash was a reddish to dark brown soil lens with a maximum thickness of 50 mm that covered only part of the pit. A further ashy fill formed the basal layer of the pit. As may also be true for Pit 1 the layers of ash represent episodes of discard and the red–brown soil represents the wash of surface material into the pit depression. Three or more discrete episodes of discard may have been involved in this instance. Finds made in both the red–brown soil and ash included potsherds, faunal material, a broken figurine, charcoal, shell beads and hornfels flakes. Pit 2 was the only pit in which slag was found.

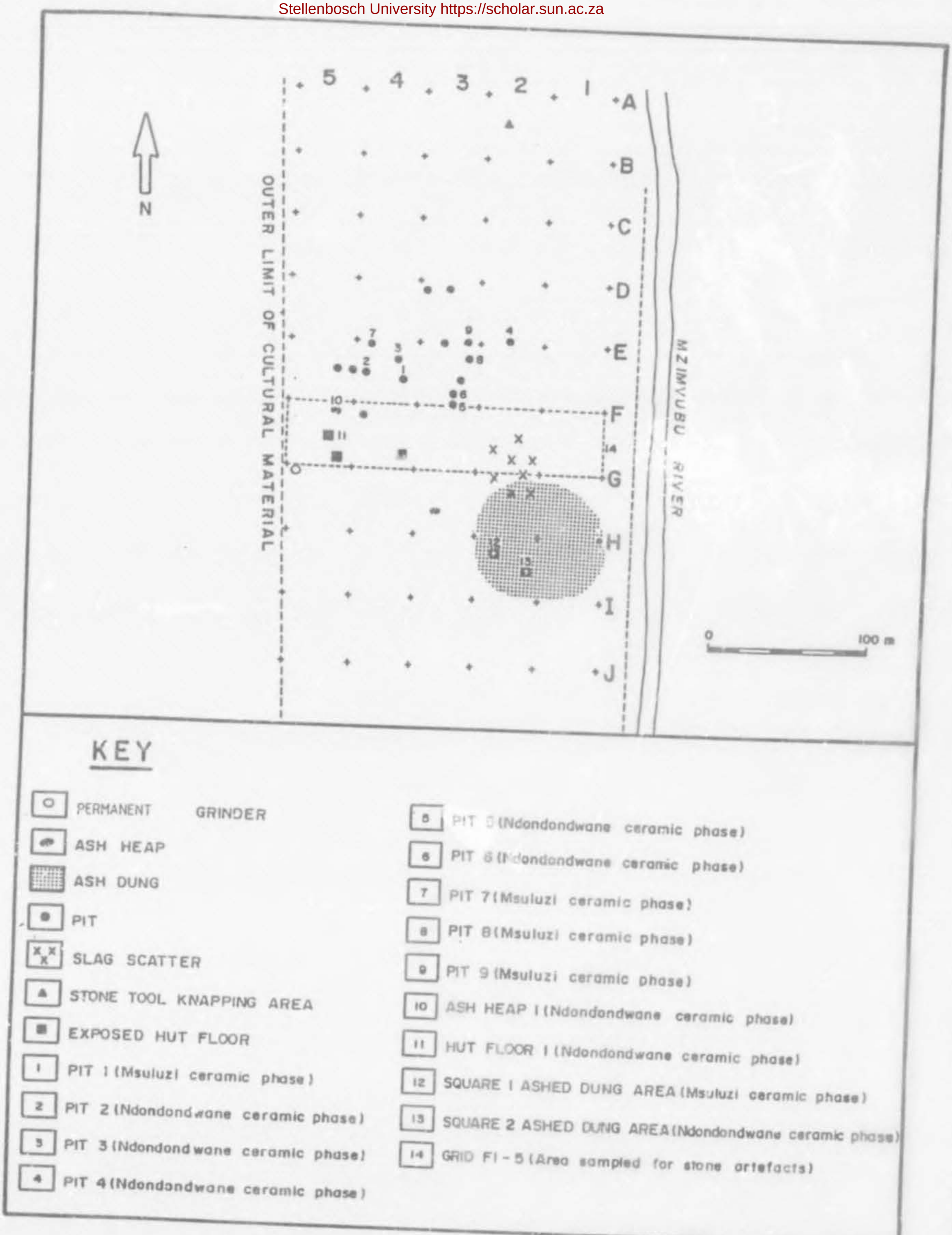


FIG. 2 PLAN OF NTSITSANA SHOWING THE EXPOSED SETTLEMENT FEATURES

Pit 3 was excavated in spits of 60 mm each. On the surface it was marked by a lag deposit of stones and potsherds. No stratigraphy was discernible and the infill consisted mostly of ash mixed with a reddish brown soil. The contents of this large pit, 2.8 m in diameter and 840 mm deep, consisted mostly of potsherds, charcoal, faunal material and shell beads. Notable finds were three, almost complete pots again with the bases broken prior to burial.

Pit 4 was marked by an almost complete pot protruding from the surface. This feature was excavated in three spits of 50 mm each. Below 150 mm undisturbed ground was encountered. Erosion had removed the bulk of the fill and only the base of the pit was preserved.

Pit 5 was indicated by a large potsherd scatter on the surface. The greater part of the pit fill had been eroded prior to excavation. The *in situ* fill was 700 mm deep and was mainly grey brown soil. No ash or ashy material was recorded. Potsherds, shell beads, an upper grindstone, faunal material and charcoal were recovered during excavation.

Pit 6 was located under the remains of a midden-like deposit. The fill consisted of a mixture of ash and grey brown soil. The pit had no clear stratigraphy with the exception of an ash fea ture in spits 7 and 8. A sheep horn core and a rib were recovered from the upper portion of the pit and from the midden respectively and a nearly complete pot occurred in a corner of the midden. The charcoal of the ashy contents of the pot was sampled separately. The pit was shallow, only 450 mm deep, and large pieces of charcoal were included in the fill.

Pit 7 was excavated to increase the sample of materials from the older phase of occupation, otherwise represented only in Pit 1. Pit 7, which was 850 mm deep, had poor stratigraphy although ash rich intercalations occurred. A large quantity of potsherds, faunal material, and charcoal were recovered during excavation. A small multifaceted upper grindstone was found in spit 9. Shell beads occurred in spits 12 and 13.

ASH HEAP

The remains of an ash heap roughly 2 m by 1 m in extent was exposed in a gully in the western part of the site (Fig. 2). Potsherds of the second or younger phase of occupation were scattered on the surface around this feature. Two one metre squares were excavated the total thickness which was only 150 mm and potsherds, bone materials and charcoals were recovered from an *in situ* context to supplement the surface finds.

THE BURNT DUNG AREA

A large area of burnt dung, marking the position of a series of livestock enclosures, is prominent on the eastern side of the Ntsitsana site (Fig. 2). This area measures 100 m by 80 m and the deposit was up to 1 m thick in places. Two trenches were excavated in different parts of this feature. The purpose was to recover dung samples for phytolith analysis (Chapter 6).

Trench 1 was excavated in the centre of the feature (Fig. 2), and was sunk as a metre square to a depth of 800 mm, before the base of the deposit was reached. No stratigraphy was noted and the profile was sampled in spits of 100 mm. This cutting yielded two shell beads and potsherds belonging to the older phase of occupation of the site.

Trench 2 was excavated on the eastern periphery of the dung area (Fig. 2). It was 1 m by 1.5 m and 460 mm deep. A small pit, 280 mm deep and filled with brown soil and potsherds, occurred at the bottom below the dung deposit. Potsherds recovered from this square and from the small pit in it relate to the younger phase of occupation.

CERAMICS

Ceramics were the main artefactual materials recovered during the excavations of Ntsitsana. They included both potsherds and figurine fragments. A typological analysis of the pottery was undertaken for descriptive purposes and to establish the culture stratigraphy (Appendix 1). Two ceramic phases could be identified, a Ntsitsana/Msuluzi phase dating to c. AD 660 and a Ntsitsana/Ndondondwana phase dated to c. AD 770. Ceramics of similar typology and age occur in Natal and the terms Msuluzi and Ndon-dondwane (Maggs 1989) are used here to indicate this.

HUT FLOORS

Pieces of burnt daga (adobe) with stick and thatch impressions were found scattered on the surface of the site. These are the traces of burnt huts. Sheet erosion had exposed the remains of two hut floors on the western side of the site (Fig. 2). The best preserved had probably been an oval shaped hut with a diameter of about 4 m. Two trenches were excavated through this feature in an attempt to locate the hearth and any associated charcoal. Although an ashy lens was exposed it contained no charcoal. Ntsitsana/Ndondondwane type pottery was associated with this hut. Like the huts on equivalent aged Natal sites but unlike Early Iron Age huts at Broederstroom (Mason 1986) and Schroda (Hanisch 1981) it showed no special floor construction.

SLAG

Evidence for the smelting of iron was found by Feely (1985, 1987) at two first millennium sites in the middle reaches of the Mzimvubu River. Slag and tuyere fragments were recorded at an additional site during the course of this investigation. The excavations at Ntsitsana yielded two pieces of smelter slag from Pit 2 in association with Ntsitsana/Ndondondwane pottery. The stratigraphic evidence thus confirms the association of slag and other Early Iron Age cultural material. Other pieces of slag occurred in a localised scatter on the eroded surface adjacent to the burnt dung area (Fig. 2). The proximity of the smelting/smithing area to the livestock enclosure, which is also considered to be part of the male domain, is consistent with the spatial organisation in the ethnographic present and early farming sites generally.

The surface slag sample had a mass of 3.5 kg. A search using a magnetometer failed to reveal any other slag on this major site. The quantity of slag is negligible considering the scale of occupation of Ntsitsana and it is apparent that only small-scale smithing occurred there. About 10 km downstream from Ntsitsana on the Mzimvubu River, by contrast, large quantities of slag, tuyere fragments, furnace wall pieces, and ferricrete nodules (iron ore) are visible on Site 4048 (Fig. 1). Pottery on Site 4048 belongs to both the Ntsitsana/Msuluzi and Ntsitsana/Ndondondwane ceramic phases and thus the site was occupied over the same period as Ntsitsana. Site 4048, rather than Ntsitsana, may have been a centre for iron working. Unlike those in Natal (Maggs 1984c), the Mzimvubu sites do not seem to have been self sufficient in iron working. Local differences in the grade of ore that was available, probably ferricrete (Appendix 2), may have determined where smelting activities were carried out and on what scale.

STONE ARTEFACTS

Seventeen informal flaked stone artefacts were recovered from five of the pits. There were also a large number of stone artefacts on the eroded surface of the site. A collection was made of all the stone material occurring in grid area F1–F5 which measures 160x40m and is adjacent to the pit cluster (Fig. 2). The stone artefacts are associated with potsherds. Ninety seven stone artefacts were collected, all made of hornfels (lydianite), and about 70 percent show edge damage due to cattle trampling. A typological classification of the artefacts is given in Table 2.

Table 2. Stone artifact types of Ntsitsana.

Type	Quantity
Adze	4
Core	14
Hammerstone	4
Large scraper	2
Miscellaneous retouched piece	4
Unretouched flakes	86
Total	114

The sample is characterised by a large percentage of unstandardised and unretouched flakes on poor quality hornfels. Edge modification other than damage from trampling is restricted to battering on a few of these pieces. The more formal component of the artefacts in the sample is typologically Later Stone Age; some of these pieces are well patinated and are probably not associated with occupation by early farmers. There seems no reason to doubt that the less formal component is contemporary with early farming settlement.

Stone tools have been found at a number of early farming sites in Transkei and elsewhere in southern Africa (Derricourt 1977; Maggs 1980a; Mason 1981; Evers 1982; Roi-ey 1985; Feely 1987). There are two possible explanations; either there were stone tool using people living at the site along with people using iron tools or iron was not abundantly available and stone tools were used for some tasks. As there is no other supporting evidence in the material remains that stone tool-using San groups were living on the site the second explanation is favour d. Stone tool-using people like the San may of course have visited the site. They were certainly living in the general region in historical times (Lister 1949:122) and most probably did so during the first millennium as well. The occurrence of stone artefacts on Ntsitsana, however, does not necessarily indicate any contact between them and farmers. Iron smelting on a large scale may not have been possible in much of Transkei (Feely 1985, 1987; Whitelaw 1991) and there are ethnographic accounts and oral traditions that stone flakes (Xhosa: *intshengece*) were part of the equipment used by Xhosa speaking people until recent times (Makalima 1945; Shaw & Van Warmelo 1974, 1981; personal interviews Tabankulu 1987, Flagstaff 1990). The simplest explanation is that the occurrence of stone artefacts at Ntsitsana reflects the relatively high cost of iron tools.

GRINDSTONES

The upper and lower grindstones from Ntsitsana are very similar to those found on first millennium farming sites in Natal. The lower grindstones, many of which are deliberately broken, show the well-worn elliptical hollows. The hollows are some 180 mm long, 50 mm wide and up to 12 mm deep. Upper grindstones are fairly small, well used, and have an approximately cuboidal shape with curved facets. It has been suggested that the typical grooves on the lower grindstones were suitable for grinding small grained millets such as have been identified on the Ndondondwane site in Natal (Maggs 1984c:341). The grindstones may be taken as indirect evidence for millet cultivation at Ntsitsana. Grindstones are not as common at Ntsitsana and other early farming sites in Transkei as they are at sites of equivalent age in Natal (Feely pers. comm.). At Ntshekane in Natal, for example, one pit produced 26 lower grindstone fragments (Maggs & Michael 1976). Only two typical first millennium upper grindstones were recovered from the six pits excavated at Ntsitsana while two lower grindstones were found on the surface of the site. While the paucity of grindstones could be cited as evidence that cereal cultivation was less important in Transkei than Natal it has not been established that there is a simple relationship between number of grindstones and cereal production. It is also possible that Transkei grindstones were harder and therefore lasted longer.

DATING

Three charcoal samples were submitted to the CSIR radiocarbon dating laboratory. The results are given in Table 3.

Table 3. Radiocarbon dates for the Ntsitsana site

No	Sample designation	Age (yrs BP)
Pta - 4687.	Ntsitsana Pit 6	1180 ± 50 (770 AD)
Pta - 4695.	Ntsitsana Pit 5	1180 ± 50 (770 AD)
Pta - 4684.	Ntsitsana Pit 1	1290 ± 50 (660 AD)

Pta-4687 was collected at a depth of 150 mm in Pit 6. Pta-4695 was collected at 200 mm in Pit 5, and Pta-4684 came from spit 3 at 150 mm in Pit 1. The radiocarbon age difference of about 200 years between the sample from Pit 1 and the samples from Pits 5 and 6, is consistent with the expected age difference of the samples as inferred from the ceramics.

NGOSI - SECOND MILLENNIUM FARMING SITE

INTRODUCTION

Second millennium farming settlements conform to the historical pattern of dispersed Nguni homesteads (Sansom 1974). Such settlements were abandoned after a few decades (Shaw & Van Warmelo 1972; Peires 1981) and they do not form impressive archaeological sites. The sites occur both in valley bottom situations and, in contrast to early farming settlement sites, on the higher interfluves between the valleys. Apart from pottery, ash heaps are the most significant archaeological traces of these occupations. Undecorated potsherds and unifaceted upper and broad shallow grooved lower grindstones are characteristic finds on second millennium farming sites.

A second millennium farming site (4052) located by Feely (1987) near the Ngosi forest had three exposed ash heaps. This has been designated the Ngosi Site and was chosen for excavation as it offered the best potential to obtain palaeoecological data for comparison with Ntsitsana. The site is situated adjacent to the Mzimvubu River on alluvial soils at approximately 29° 13'S and 31° 03'E and 500 m.a.s.l.

HISTORICAL BACKGROUND

The Ngosi area, and by extension the site, can be placed in historical context and the original inhabitants identified from ethnohistorical sources and local oral tradition. Local informants hold that the site was originally occupied by the Bhaca, who as refugees, fled Natal during the expansion of the Zulu kingdom (Wilson 1985; Maylam 1987). Cwera inhabitants of the area maintain that the homestead was not recoccupied after the Bhaca were driven away by the Mpondo in the 1840's although the lands were cultivated. Scully (1909) suggests that apart from San groups the area was uninhabited immediately prior to Bhaca occupation, although it was claimed by chief Faku of the Mpondo.

Faku had allowed the Bhaca to settle near the coast at Intafufu. The coastal lands were fertile but ticks made the region unfavourable for cattle keeping. For this reason, under their leader Ncapayi, the Bhaca migrated towards the middle reaches of Mzimvubu River. The Great Place of the Bhaca was established at Isilindini (Wilson 1943), 8 km south of Ngosi (Fig. 1). It was during this period that the incident known in history as "The Ncapayi Affair" occurred. In AD 1840 a Natal white settler commando, under the leadership of Andries Pretorius, attacked the Bhaca. About 40 of Ncapayi's people were killed and three thousand head of cattle and about two thousand sheep and goats were seized (Scully 1909; Wilson, D. 1943; Liebenberg 1977; Wilson, M. 1985). In AD 1845 the Bhaca were driven out of the area by the Mpondo and they finally settled in the Mount Frere district (Scully 1909; Wilson 1943; Hammond-Tooke 1962).

The present inhabitants of the area are Cwera and although related to the Xesibe are Mpondo subjects (Jackson 1975). According to local informants interviewed in 1988 the Cwera aided the Mpondo in their fight against the Bhaca and the area was given to them by Chief Faku as a sign of goodwill and in order to create a buffer zone between the

Bhaca and the Mpondo. The Ngosi site can be identified therefore with some certainty from historical sources as a Bhaca homestead which was occupied sometime between AD 1820 and AD 1845.

THE SITE

The potsherd scatter on Ngosi covers an area of approximately 3 ha. The area which included the ash heap remains was mapped by a two tier grid system. The remains of a cattle kraal were located adjacent to the ash heaps. A site plan was drawn, and all the ash heaps and the cattle kraal were plotted (Fig. 3).

THE ASH HEAPS

Three ash heaps were located on the north eastern portion of the site directly adjacent to the Mzimvubu River (Fig. 3). Ethnographic sources suggest that ash heaps indicate the nearby location of huts (Raum 1973; Davison 1988). The erosion of these features at Ngosi was at an advanced stage and only portions were preserved. A greyish soil together with charcoal and bone fragments, were visible surface markers. The heaps were excavated in 1 x 1 m squares and a single square was adequate to cover a whole feature. No stratigraphy was observed and the heaps were excavated in 50 mm spits.

Ash heap 1 was excavated to a depth of 250 mm. Spits 1 to 3 produced burnt bone fragments and charcoal, whilst spits 4 and 5 intersected the underlying strata. Ash heap 3 was excavated to a depth of 250 mm. This ash heap was similar in form and size to that excavated in Square 1. Charcoal and bone fragments came from the upper 150 mm. Ash heap 3 was adjacent to a cattle kraal and was excavated to a depth of 200 mm. Bone fragments and charcoal, including a carbonised maize cob, were recovered from the upper three spits. In addition, potsherd material, a fragment of an animal figurine and a horn were recovered.

Dating : A charcoal sample from 200 mm below the surface from ash heap 3 was radiocarbon dated to 160 ± 50 BP (Pta-4688). This result means that the true age can be calibrated to as old as 1750 AD or as young as 1830 AD. The younger limit corresponds to early Bhaca settlement in Transkei and is considered the more likely age.

CATTLE KRAAL

The position of a cattle kraal was indicated by a more extensive ashy occurrence. In contrast to the ash heaps no bone material or charcoal could be seen on the surface. Excavation of part of this feature (Square 2) (Fig. 3) confirmed the interpretation that it was a kraal area as recognisable cattle dung was preserved in spit 3.

CERAMICS

The potsherd assemblage from Ngosi was too small (22 sherds) to be [illegible]ogically significant and it was not possible to provide a reconstruction of different [illegible]ssels. The small potsherd assemblage can be explained by the fact that Ngosi was an isolated homestead rather than a village and it was most probably inhabited for a limited period.

All the potsherds were plain and bear no evidence of surface decoration or special surface treatment like burnishing. There are some lip profiles that contain both rounded and flattened sections, and some potsherds are decorated with notches on a generally rounded lip. Notched lip decoration is recorded on vessels traditionally made by Mpondo, Tembu and the Bomvana of Transkei (Lawton 1967; Shaw & Van Warmelo 1974). It seems to be a typical southern Nguni ceramic decoration. However, rim notching is not recorded on Bhaca ceramic vessels in the published literature (Hammond-Tooke 1962; Lawton 1967; Shaw & Van Warmelo 1974). This may seem to contradict the identity of the site as a Bhaca settlement but the presence or absence of single decorative motifs cannot be interpreted in simplistic terms. It is possible, for example, that the Bhaca when living under the Mpondo in the 1830's used decorative motifs to signify identity with the Mpondo. Another possibility is that the Bhaca got such vessels by trading with the Mpondo who were their immediate neighbours. There may also have been Mpondo wives amongst the community (Makaula 1988).

GRINDSTONES

Upper and lower grindstones diagnostic of second millennium settlement locations occurred on the eroded surface of the site. In contrast to the grindstones of the first millennium those of the second millennium AD are characterised by larger worn surfaces produced by grinding maize rather than millet. As early as AD 178[illegible] survivors of shipwrecks on the Transkei coast described the cultivation of maize (Shaw & Van Warmelo 1981). A carbonised maize cob found at Ngosi provides direct support for maize cultivation being established sometime before the earlier decades of the last century. Water rolled cobbles were used as upper grindstones (Xhosa: *mbokodo*) and have only one worn surface. The lower grindstones have a shallow circular to broad elliptic hollow which exceeds 350 mm in diameter. These grindstones have an average mass of 9 kg. Much larger lower grindstones with a mass of about 70–100 kg came into use some 80 years ago with the

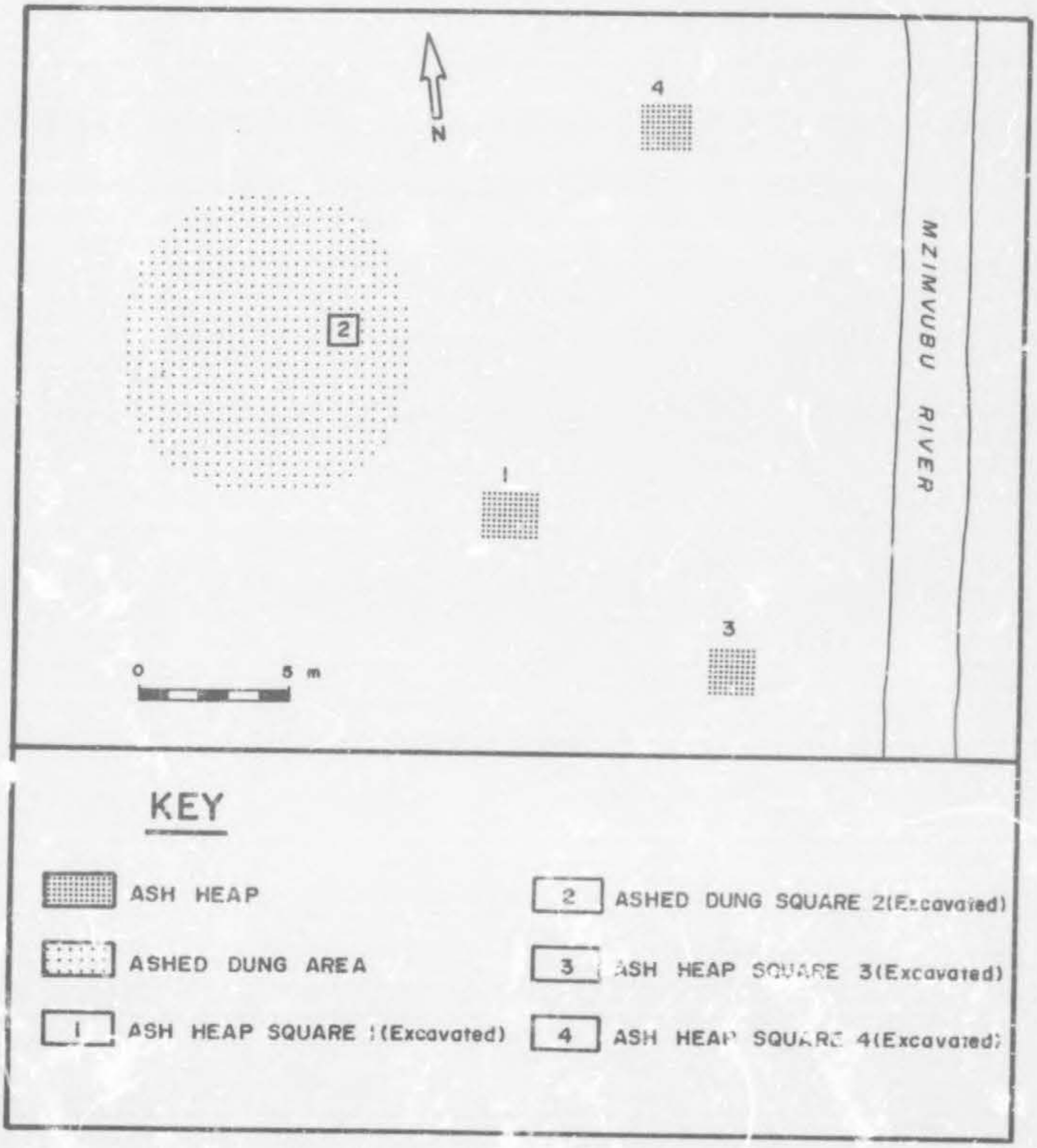


FIG. 3 PLAN OF NGOSI SHOWING THE EXCAVATED SETTLEMENT FEATURES

introduction of ox-drawn sledges (Feely 1987). The hollows on the lower grindstones at Ngosi are generally very shallow. On some grindstones a distinct hollow is not developed and only a flattish grounded surface is present. This is consistent with the short period of Bhaca occupation suggested by ethnohistory.

NQUKWE – TRADITIONAL CWERA HOMESTEAD

INTRODUCTION

The excavation of part of a recently abandoned Cwera homestead, Nqukwe, was prompted by two considerations. Firstly, as the research at Ntsitsana focussed on pits and kraal features this site provided an opportunity to investigate similar features in an ethnographic context. The function of the features could be discussed with informants and it was anticipated that the Nqukwe site would serve as an analogue for the interpretation of some of the evidence obtained from Ntsitsana. This has proved the case though not in a direct way. The observations have high lighted the differences rather than the similarities between settlement organisation in the first millennium AD and in later times. Secondly, Nqukwe provided an opportunity to obtain charcoal from more recent deposits. In terms of the goals of the project this was a major consideration as it provided a further bench mark observation on vegetation change.

THE SITE

The old homestead (Xhosa: *umzi*) is located on a ridge overlooking the Ntsitsana site (Fig. 4). According to local inhabitants this homestead was abandoned sometime between AD 1950 and 1960. The head of the homestead was known by the clan name (Xhosa: *iziduko*) Nqukwe and the site was named after him. Several features of the homestead were visible on the surface. These included four hut (Xhosa: *indlu*) foundations, a cattle byre (Xhosa: *ubuhlanti*) and four ash heaps. Five shallow depressions in the cattle byre marked the position of grain pits (Xhosa: *isisele*).

The Nqukwe site illustrates a vari[illegible] settlement organisation that is found in southern Bantu homesteads (Kuper 1980, 1982), and referred to as the "central cattle pattern" (Huffman 1986). Nqukwe is characterised by a straight row of huts opposite the cattle byre (Fig. 4). This pattern differs from the earlier (c. AD 1850) southern Nguni settlements where a hut circle occurred round the kraal (Shaw & Van Warmelo 1972; Derricourt 1974, 1977) and indicates structural variation (Davison 1988).

THE EXCAVATION

A grid was laid over the site and all the homestead features were mapped prior to the excavation (Fig. 4). The grain pits that were excavated were located in the cattle byre. An isolated ash heap, situated between the kraal and the huts, was also excavated.

THE GRAIN PITS

Two depressions in the cattle kraal were excavated. The first, Pit 1, was excavated in spits of 100 mm each. At 180 mm below the surface of this depression an intact, but empty, grain pit was exposed. This pit was evidently carefully closed and covered with a few large stones that included a broken upper grinder. As Pit 1 showed no filling deposits another grain pit (Pit 2) was excavated in spits of 100 mm to a depth of 1.50 m. The fill consisted mostly of a sandy soil and some stones. A large flat stone, the cover stone for the pit (Xhosa: *isikiko*), was found with other smaller stones in the upper portion of the pit.

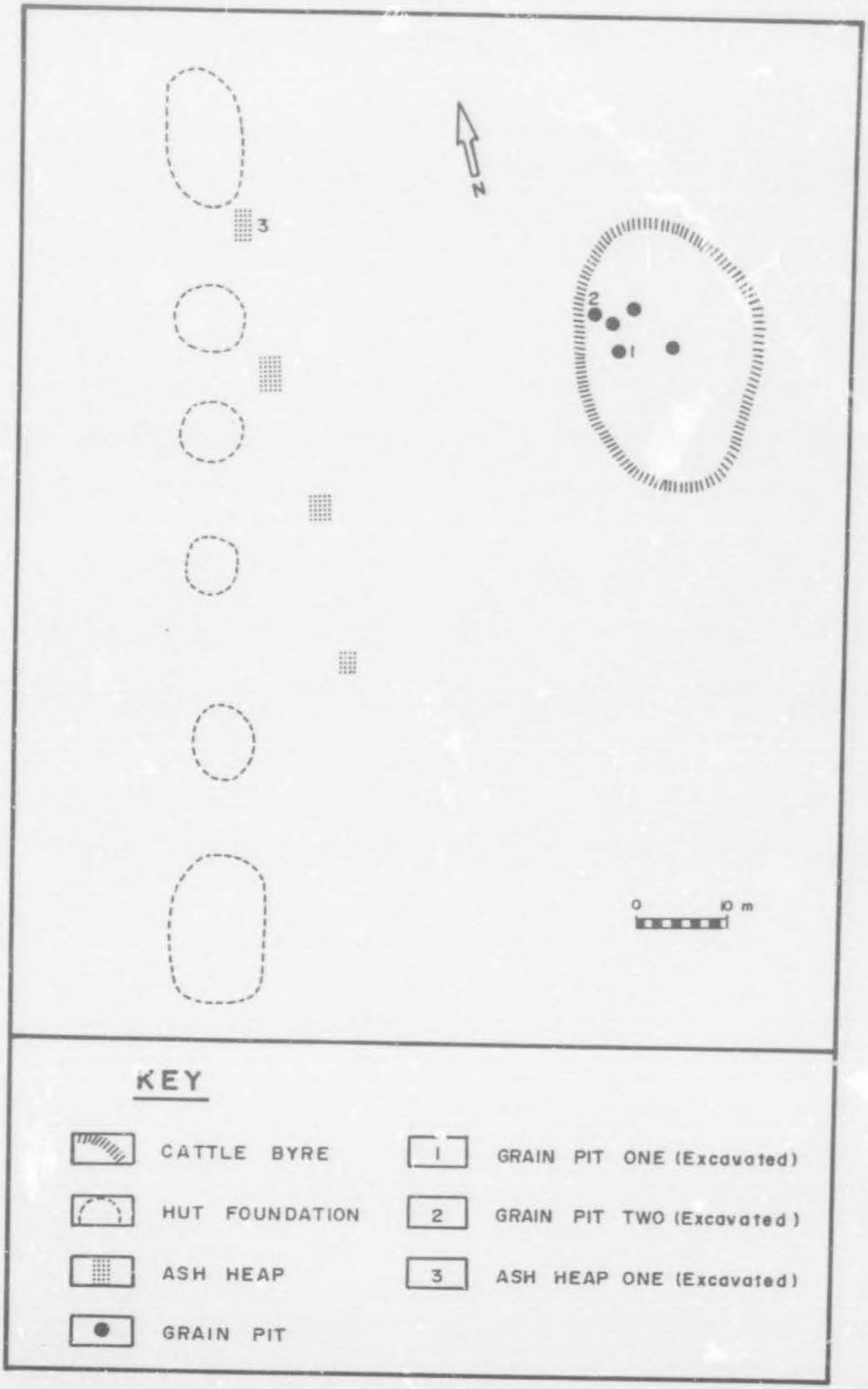


FIG. 4 PLAN OF NQUKWE TRADITIONAL CWERA HOMESTEAD

Some glass splinters, scrap metal and bird bones came from the pit. There was no ashy material in the fill.

From the contents of the fill (Table 4) it is apparent that these sub-modern grain pits are a poor analogue for pits belonging to the earliest phase of settlement. Local informants stated that grain pits were not as a rule filled in on the abandonment of a homestead. Further they commented that domestic rubbish was generally discarded in the veld or on ash heaps and not in the cattle kraal. This would be consistent with the result of the excavations. Although a few items of refuse were recovered from Pit 2 there is no evidence for the disposal of domestic waste in pits on the scale observed on sites belonging to the earliest phase of farming settlement. The reason for this difference in where waste was discarded is discussed more fully in Chapter 10. The difference is significant and has to do with the location of male and female domains and control of the production of grain.

Table 4. Comparison between Early Iron Age pits from Ntsitsana and modern traditional grain pits from Nqukwe

First millennium farmer pits	Nqukwe grain pits
Filled with alternating layers of ash and soil	Predominantly filled by natural processes
Stone accumulation in upper portion of pit	Stone accumulation in upper portion of pit
Domestic waste abundant: ash, charcoal, seeds, shell, bone	Occasional bone: charcoal, shell, seeds absent
Cultural material: grindstones, beads, figurines, potsherds, red ochre	Occasional grindstone present but other cultural materials largely absent
Pits located outside kraal area	Pits located in cattle byre

ASH HEAP

The largest ash heap at the homestead (Fig. 4) was excavated in spits of 25 mm, to a depth of 100 mm, before the bottom was reached. No stratigraphy was observed. Some bone material, charcoal, three glass beads and a potsherd were recovered. The contents of this feature are similar to those from an ash heap excavated by Derricourt (1977) in the Ciskei but are too limited for separate analysis. The identification of charcoal obtained from this feature is discussed in Chapter 5.

SUMMARY

Excavations were conducted in selected areas of three sites. These sites were a first millennium farming site (c. AD 660–770) at Ntsitsana, a second millennium farming site (c. AD 1820) at Ngosi, and a Cwera traditional site (c. AD 1955) at Nqukwe. All are situated between 460 m and 680 m.a.s.l c. 70 km inland from the coast, in the Tabankulu district of Transkei. First millennium settlement features excavated included pits, part of a livestock byre and an ash heap while the second millennium features were represented by ash heaps, abandoned grain pits, and a domestic ash heap at the Nqukwe site. Although the primary objective was to obtain palaeoecological samples, the excavations have also provided samples of artefacts and information on settlement organisation. The data suggest that the distribution and organisation of early farming and modern settlements is different not only on a landscape scale but also in the patterns formed by intra-site features like pits.

5 CHARCOAL ANALYSIS

INTRODUCTION

Charcoal is an inert and remarkably stable substance. For this reason it is often the most abundant or even the only plant material that is preserved in archaeological deposits. Conditions in southern Africa as a rule are not conducive to the preservation of pollen. The region has few permanent lakes to act as pollen traps. Many plants are insect pollinated and produce little pollen. In addition climates are strongly seasonal and pollen quickly decays in soils. It is therefore not surprising that archaeologists have turned to the study of charcoal as a source of information on past vegetation and environmental conditions. The analysis of charcoal is a relatively laborious task but the results can be significant.

Most studies conducted, in southern Africa, have been of charcoal from Pleistocene and Holocene hunter-gatherer sites (Deacon et al. 1983; Prior 1983; Prior & Alvin 1983; Prior & Price Williams 1985; Dowson 1989; Tusenius 1989; Scholtz 1990). There has been a lesser interest in the study of charcoal from early farming contexts possibly because being relatively recent assumptions can be made that the environment and vegetation has not changed significantly. Still it has been appreciated that charcoal data from such contexts can be used to investigate particular problems such as the wood types used in smelting furnaces (Maggs & Ward 1984).

In this study the interest has been in obtaining data on vegetation change, linked to the impact of precolonial farming. On the earliest settlement investigated pits were the main source of charcoal. On later sites ash heaps provided all the charcoal analysed.

Charcoal and ash are domestic rubbish that have been discarded of in a convenient place. Occurrences of charcoal and ash are usually associated with discrete areas that, by analogy to modern local homesteads, are the rubbish heaps of individual kitchen huts. Such ash heaps are the result of what can be defined as primary disposal. Domestic rubbish may be removed at a later stage and may be scattered or dumped elsewhere in what is defined here as secondary disposal. The alternating layers of domestic rubbish, including ash, charcoal, and inwashed soil, in abandoned grain pits relate to secondary disposal. It is probable that more than one household used an abandoned grain pit for dumping refuse and charcoal samples from such pits may be a more representative record of general firewood collecting activities than the ash heaps of a single dwelling. Pits on the earliest settlement site investigated therefore provide some of the more ideal samples.

The collecting of firewood for household purposes in Transkei and many other regions is exclusively a woman's chore. This division of labour is so widespread that it can be assumed to have a considerable time depth. The assumption that charcoal accumulated in ash heaps was the product of wood collecting by women is warranted. Situations where charcoal from wood collected by the males of a homestead may have been sampled at hearths close to the byre (Davison 1988) have not been identified in this study. Whether such situations would show a different range of species or whether the domestic supply was simply robbed is untested. The concern in this chapter is less with the social implications of firewood collecting and more with how the natural vegetation was exploited as a source of fuel. The assumption is that charcoal discarded at the homestead reflects, in a ecologically meaningful way, what woody plants were available in the surrounds. Complicating any interpretation of results, however, is the factor of selection. Different woods have different calorific values and yields of volatiles. Collection of firewood implies some selection (Smart & Hoffman 1988) and the results obtained will not be a simple reflection of the woody vegetation. Thus allowance has to be made for selection in any interpretation. Analyses provide information that goes beyond the mere identification of individual taxa and because a single agent of collection is involved, even with selection as a factor, the results can be used to measure the richness and diversity of the vegetation.

Vegetation is composed of communities of plants. Communities are alliances of different taxa that may have varied growth forms and reproductive systems. The count of species found in a community is a definition of richness. This is a measure used in this thesis. The Shannon–Weiner index of species diversity (Goldsmith et al. 1986) has been used also. The index takes into account the total number of taxa and the relative abundance of each taxon in a sample. The index is high where the sample is composed of a relatively larger number of taxa evenly distributed and low where the sample is dominated by a few taxa. These indices give a quantitative basis for comparing samples from different times.

The charcoal was obtained through excavation and constitutes a series of samples dating from AD 660 to the present. The samples form a time series that can be used to document environmental change. As the charcoal was not uniformly abundant in the deposits investigated there are differences in sample sizes. Sample size has to be taken into account. To test whether the different sized samples could have been drawn from the same charcoal population the exact test for contingency tables (Bernstein et al. 1988) was used. The chi-square scores for the main taxa in the samples from all periods were calculated. The test makes allowance for differences in sample size but the interpretation of the significance of the results of this statistical comparisons ultimately rest on ecological and archaeological considerations.

On ecological grounds it was expected that the plant communities sampled through charcoal analysis would have been similar in overall composition to those in the present. Differences in species richness and diversity, however, were expected. From archaeological considerations it was reasoned that early farmers in the valley would have had a notable impact on the woody vegetation. The firewood collected by these people should show not only what was available but also the consequence of collecting wood, clearing lands and burning the vegetation. The analysis was undertaken with these expectations.

SAMPLING OF THE CHARCOAL FROM ARCHAEOLOGICAL CONTEXTS

Charcoal was routinely collected during excavation from the features directly (Table 5) or by water flotation of the sediments. The drying and bagging of samples took place in the field. Charcoal was provenanced by spit and feature. A minimum of 100 pieces of charcoal per excavated feature was analysed; the number depending on the abundance of charcoal in the feature. An attempt was made to sample an equal number of charcoal pieces from each spit in any layer. A random sampling approach described by Tusenius (1986) was used to reduce bias in selecting individual pieces. In total 1446 pieces of charcoal were identified.

Table 2. Association and dating of charcoal samples analysed

Site	Dating	Feature
Ntsitsana (Ntsitsana/Msuluzi phase)	660 AD	Pit 1 Pit 7
Ntsitsana (Ntsitsana/Ndondondwane)	770 AD	Pit 2 Pit 3 Pit 4 Pit 5 Pit 6 Ash heap 1
Ngosi (Bhaca homestead)	1800 AD	Ash heap 1 Ash heap 2 Ash heap 3
Nqukwe (Cwera homestead)	1950 AD	Ash heap 1
Cwera (Cwera homestead)	1990 AD	Ash heap 1
Ngoya (Cwera homestead)	1990 AD	Ash heap 1

THE REFERENCE COLLECTION

As an aid to the identification of the charcoals from the archaeological deposits a reference collection of the trees and shrubs that are growing in the area was made. Species growing in Valley Bushveld and Southern Tall Grassveld and patches of transitional afromontane forest were included. Duplicate specimens were sent to the National Herbarium, Pretoria, for identification. A list of 63 woody species identified in these vegetation types is given in Appendix 3. Voucher specimens are stored in the herbarium in the Botany Department at the University of Transkei. The wood samples in the reference collection were charcoaled following the procedure outlined by Tusenius (1986).

PREPARATION OF THE MATERIAL

Charcoal specimens for microscopy were broken by hand perpendicular and parallel to the direction of the grain (Tusenius 1986). Cross sections (CS), radial longitudinal sections (RLS) and tangential longitudinal sections (TLS) of these specimens were mounted in lumps of `Prestik' on glass slides and examined. A Wild M8 compound light microscope, with magnifications of 50X, 100X, 200X, and 420X, was found adequate to make most of the initial charcoal identifications and to group specimens into taxa.

Specimens for Scanning Electron Microscopy (SEM) were mounted on aluminium stubs with nail polish. After drying in a vacuum dessicator they were gold-coated in an atmosphere of argon (Tusenius 1986). Scanning Electron Microscopy was used to verify light microscope identifications and to take photomicrographs. Sets of photomicrographs at a standard magnification were made of the various anatomical features. Photomicrographs were routinely taken at 50X, for the CS, 100X for the TLS and 100X and 500X for the RLS (Appendix 4).

METHODS

TAXONOMIC IDENTIFICATION

Charcoal pieces are identified by comparing the anatomical features in the unknown fragment with modern reference material by use of a key. In this study the focus was on broad groupings rather than the specific identification of a particular specimen and the reference collection made proved more than adequate. In addition it was found that the

CS and TLS together allowed the distinction between most taxa to be made. Taxa were identified up to genus level and in some instances it was also possible to distinguish characteristic species. In the excavated samples a total of 34 taxa could be recognised using the SEM photographs of the reference material for comparison. These taxa are described and illustrated in Appendix 4 whilst the relative abundances of each taxonomic group or type found in the samples analysed is given in Tables 6–12.

PIECE SIZE ANALYSIS

As shown by Salisbury & Jane (1940) an estimate of the diameter of the branch or stem charcoal can be made from the growth rings and this approach provides additional information on firewood collecting practices. The method outlined by Scholtz (1986) was followed. The SEM photomicrographs of both the excavated charcoal from the Ntsitsana site and the modern reference collection were used. The photomicrographs of excavated charcoal represent a mixture of material collected between AD 660 and AD 770, and represent the whole period of occupation of Ntsitsana. Measurement of the reference collection was carried out to serve as a modern control. The photomicrographs covered the same range of species in both assemblages. A total of 60 photomicrographs, two from each of the 30 species, were analysed in this study. The results are discussed below.

Table 6. Identified charcoal morphological types for all periods. Samples from similar features were grouped together. (Results from the ash heap belonging to the period AD 770 are excluded)

Taxon / Site / Years AD	Cwera/Ngoya 1990 (n=200)		Nqukwe 1950 (n=98)		Ngosi 1800 (n=254)		Mtsitsana 770 (n=410)		Mtsitsana 660 (n=382)	
	no	%	no	%	no	%	no	%	no	%
Acacia caffra	10	5	6	6.1	26	10.2	52	12.7	26	6.8
Acacia karroo/robusta	46	23	52	53	22	8.7	88	21.5	76	19.9
Adenopodia spicata					2	.8				
Apodytes dimidiata									2	.5
Bauhinia/Coddia spp.					8	3.1			22	5.8
Boscia albitrunca					22	8.7			8	2.1
Buddleia saligna	18	9			8	3.1				
Cadaba natalensis	2	1							4	1
Calpurnia aurea					2	.8				
Cassine aethiopica					2	.8				
Celtis africana	16	8	14	14.3	12	4.7	12	3	22	5.8
Clerodendrum glabrum					2	.8	4	1	2	.5
Combretum erythrophyllum							22	5.4	2	.5
Cussonia sp.					2	.8	2	.5		
Dalbergia obovata							2	.5	4	1
Diospyros/Euclea spp.	10	5	2	2	2	.8	26	6.3	10	2.6
Dovyalis caffra	32	16	2	2			6	1.5	20	5.2
Ehretia rigida	4	2								
Euphorbia tirucalli	10	5	12	12.2						
Hippobromus pauciflorus					14	5.5			2	.5
Kiggelaria africana					4	1.6				
Maytenus spp.	10	5							2	.5
Olea europaea	16	8	4	4.1	26	10.2	94	23	76	19.9
Pappea capensis							2	.5		
Protaspagus divaricatus					2	.8			2	.5
Ptaeroxylon obliquum	4	2			18	7.1	50	12.2	48	12.6
Rhoicissus tomentosa									4	1
Rhus spp.					10	3.9	4	1	8	2.1
Schotia brachypetala			6	6.1	8	3.1	14	3.4	4	1
Sideroxylon/Lycium spp.					24	9.4			4	1
Tarchonanthus camphoratus	16	8			30	11.8	14	3.4	22	5.8
Trichilia emetica					2	.8				
Vepris undulata					6	2.4	2	.5	2	.5
Ziziphus mucronata	6	3					16	4	10	2.6

Table 7. Charcoal morphological types identified in Ntsitsana/Msuluzi ceramic phase c. AD 660 (Ntsitsana)

Taxon	Feature :	Pit 1 (n=260)		Pit 7 (n=122)	
		no	%	no	%
Acacia caffra		20	8.1	6	5.8
Acacia karroo/robusta		58	20.4	18	14.5
Adenopodia spicata					
Apodytes dimidiata		2	.6		
Bauhinia/Coddia spp.		22	7		
Boscia albitrunca		8	2.5		
Buddleia saligna					
Cadaba natalensis		4	1.6		
Calpurnia aurea					
Cassine aethiopica					
Celtis africana		14	5.5	8	6.4
Clerodendrum glabrum		2	1		
Combretum erythrophyllum		2	1		
Cussonia sp.					
Dalbergia obovata		4	1.6		
Diosphyros/Euclea spp.		10	5		
Dovyalis caffra		4	2	16	12.9
Euphorbia tirucalli					
Hippobromus pauciflorus		2	1		
Kiggelaria africana					
Maytenus spp.		2	.6		
Olea europaea		36	15	40	32.2
Pappea capensis					
Protaspagus divaricatus		2	.6		
Ptaeroxylon obliquum		24	9.8	24	19.4
Rhoicissus tomentosa		4	1.2		
Rhus spp.		8	3.2		
Schotia brachypetala				4	3.2
Sideroxylon/Lycium spp.		4	1.6		
Tarchonanthus camphoratus		22	7.6		
Trichilia emetica					
Vepris undulata				2	1.6
Ziziphus mucronata		6	2.6	4	3.2

Table 8. Charcoal morphological types identified in Ntsitsana/Ndondondwane phase c. AD 770 (Ntsitsana)

Taxon Feature:	Ash heap 1		Pit 2		Pit 3		Pit 5		Pit 6	
	(n=100)		(n=106)		(n=104)		(n=100)		(n=100)	
	no	%	no	%	no	%	no	%	no	%
Acacia caffra			20	18.5	14	14	4	4	14	14
Acacia karroo/robusta	86	86	24	22.2	42	40			22	22
Adenoprdia spicata										
Apodytes dimidiata										
Bauhinia/Coddia spp.										
Boscia albitrunca										
Buddleia saligna										
Cadaba natalensis										
Calpurnia aurea										
Cassine aethiopica										
Celtis africana	2	2	4	4	4	4	4	4		
Clerodendrum glabrum			4	4						
Combretum erythrophyllum			4	4	4	4			14	14
Cussonia sp.			2	2						
Dalbergia obovata					2	2				
Diospyros/Euclea spp.	6	6	10	10	8	8	8	8		
Dovyalis caffra			2	2	4	4				
Euphorbia tirucalli										
Hippobromus pauciflorus										
Kiggelaria africana										
Maytenus spp.										
Olea europaea	6	6	12	11	12	12	62	62	8	8
Pappea capensis			2	2						
Protaspagus divaricatus										
Ptaeroxylon obliquum			2	2	4	4	8	8	36	36
Rhoicissus tomentosa										
Rhus spp.			4	4						
Schotia brachypetala			2	2			12	12		
Sideroxylon/Lycium spp.										
Tarchonanthus camphoratus			8	7	2	2			4	4
Trichilia emetica										
Vepris undulata			2	2						
Ziziphus mucronata			4	4	8	8	2	2	2	2

Table 9. Charcoal morphological types identified for Ngosi site c. AD 1800

Taxon	Feature: Ash heap 1 (n = 54)		Ash heap 2 (n = 104)		Ash heap 3 (n = 96)	
	no	%	no	%	no	%
Acacia caffra	4	6.6			22	22.9
Acacia karroo/robusta	6	10	12	11.5	4	4.2
Adenopodia spicata	2	3.3				
Apodytes dimidiata						
Bauhinia/Coddia spp.			8	7.7		
Boscia albitrunca	2	3.3	16	15.4	4	4.2
Buddleia saligna			6	5.7	2	2.1
Cadaba natalensis						
Calpurnia aurea			2	1.9		
Cassine aethiopica			2	1.9		
Celtis africana	2	3.3	10	9.6		
Clerodendrum glabrum			2	1.9		
Combretum erythrophyllum						
Cussonia sp.			2	1.9		
Dalbergia obovata						
*Diospyros/Euclea*spp.			2	1.9		
Dovyalis caffra						
Euphorbia tirucalli						
Hippobromus pauciflorus	2	3.3			12	12.5
Kiggelaria africana	4	6.6				
Maytenus spp.						
Olea europaea	10	16.6	8	7.7	8	8.3
Pappea capensis						
Protaspagus divaricatus					2	2.1
Ptaeroxylon obliquum	2	3.3	8	7.7	8	8.3
Rhoicissus tomentosa						
Rhus spp.	10	16.6				
Schotia brachypetala			2	1.9	6	6.25
Sideroxylon/Lycium spp.	8	13.3	16	15.4		
Tarchonantus camphoratus	2	3.3	6	5.7	22	22.9
Trichilia emetica			2	1.9		
Vepris undulata					6	6.25
Ziziphus mucronata						

Table 10. Charcoal morphological types identified from Nqukwe c. AD 1950

Taxon	Feature : Ash heap (n = 98) no	%
Acacia caffra	6	6.1
Acacia karroo/robusta	52	53
Adenopodia spicata		
Bauhinia/Coddia spp.		
Boscia albitrunca		
Buddleia saligna		
Cadaba natalensis		
Calpurnia aurea		
Cassine aethiopica		
Celtis africana	14	14.3
Clerodendrum glabrum		
Combretum erythrophyllum		
Cussonia sp.		
Dalbergia obovata		
Diospyros/Euclea spp.	2	2
Dovyalis caffra	2	2
Euphorbia tirucalli	12	12.2
Hippobromus pauciflorus		
Kiggelaria africana		
Maytenus spp.		
Olea europaea	4	4.1
Pappea capensis		
Protaspagus divaricatus		
Ptaeroxylon obliquum		
Rhoicissus tomentosa		
Rhus spp.		
Schotia brachypetalia	6	6.1
Sideroxylon/Lycium spp.		
Tarchonanthus camphoratus		
Trichilia emetica		
Vepris undulata		
Ziziphus mucronata		

Table 11. Modern charcoal (AD 1990) obtained from an ash heap at Cwera, near Ntsitsana

Taxa	Number (n = 100)	Percentage %
Acacia caffra	2	2
Acacia karroo/robusta	26	26
Buddleia saligna	4	4
Celtis africana	4	4
Diospyros/Euclea spp.	6	6
Dovyalis caffra	18	18
Ehretia rigida	4	4
Euphorbia tirucalli	2	2
Maytenus spp.	8	8
Olea europaea	6	6
Ptaeroxylon obliquum	2	2
Tarchonanthus camphoratus	16	16
Ziziphus mucronata	2	2

Table 12. Modern charcoal (AD 1990) obtained from an ash heap at Ngoya, near Ngosi

Taxa	Number (n = 100)	Percentage %
Acacia caffra	8	8
Acacia karroo/robusta	20	20
Buddleia saligna	14	14
Cadaba natalensis	2	2
Celtis africana	12	12
Diospyros/Euclea spp.	4	4
Dovyalis caffra	14	14
Euphorbia tirucalli	8	8
Maytenus spp.	2	2
Olea europaea	10	10
Ptaeroxylon obliquum	2	2
Ziziphus mucronata	4	4

ECOLOGICALLY DIAGNOSTIC XYLEM ANALYSIS (EDXA)

The environmental conditions under which wood grows are reflected in the anatomy of the plant. The form of cell elements and fibre tissues of the xylem can be used as a record of the environmental conditions under which a plant grew. The anatomical features can be quantified using SEM photographs and the photographs can also be used to measure minimum piece sizes. Scholtz (1986) has used the term EDXA to describe such measures. In this study two specimens of each of thirty "fossil" taxa were compared with the reference material. Several indices relating to vessel size and density were calculated more as a test of the method than an application.

DISCUSSION OF RESULTS

The oldest samples show that the main constituents of the fire wood collected in the period AD 660 (Table 7) were the species that are still found in the Valley Bushveld (Table 13). Typical Valley Bushveld species included *Dovyalis caffra*, *Maytenus* spp., and *Rhus* spp. but these occur in relatively low frequencies in comparison to *Acacia karroo/robusta* and *Olea europaea*. The prominence of *Olea europaea* and *Acacia karroo*, a subtropical pioneer species, in the samples can be explained by their being good firewood (Palmer & Pitman 1972; Archer 1988; Eberhard 1990). Alternatively the prominence of *Acacia karroo/robusta*, in the charcoal samples, suggests that the vegetation was already secondary by AD 660. Some species identified, like *Dalbergia obovata*, *Hippobromus pauciflorus*, and *Vepris undulata*, occur characteristically in afromontane forests (Tables 7 & 13).

Table 13. Vegetation community which occurred in Mzimvubu River Valley as suggested by woody taxa identified in charcoal assemblage.

	Vegetation community		
Taxon	Afromontane Forest	Southern Tall Grassveld	Valley Bushveld
Acacia caffra		X	X
Acacia karroo/robusta		X	X
Adenopodia spicata			X
Bauhinia/Coddia spp.			X
Boscia albitrunca			X
Buddleia saligna		X	X
Cadaba natalensis			X
Calpurnia aurea	X		
Cassine aethiopica	X		
Celtis africana		X	X
Clerodendrum glabrum			X
Combretum erythrophyllum			X
Cussonia sp.	X	X	X
Dalbergia obovata	X		
Diospyros/Euclea		X	X
Dovyalis caffra		X	X
Euphorbia tirucalli			X
Hippobromus pauciflorus	X		
Kiggelaria africana	X		
Maytenus spp.		X	X
Olea europaea	X		X
Pappea capensis			X
Protaspagus divaricatus			X
Ptaeroxylon obliquum	X		X
Rhoicissus tomentosa			X
Rhus spp.		X	X
Schotia brachypetala		X	X
Sideroxylon/Lycium			X
Tarchonanthus camphoratus		X	X
Trichilia emetica			X
Vepris undulata	X		
Ziziphus mucronata		X	X

There are afromontane forest patches approximately 3.8 and 6.5 km to the north and north east of Ntsitsana. Forest can only survive in sheltered locations on steep slopes and at higher altitudes than Valley Bushveld. It is therefore unlikely that forest would have occurred closer to Ntsitsana in the recent past. Hence occasional longer collecting trips can be inferred. Piece size analysis shows that wood of medium to large diameter (30–45mm) was systematically collected and suggests wood was trans ported as bundles of carefully sized pieces (Tables 14 & 15).

Table 14. Minimum Piece Diameter Analysis (MPDA) – first millennium (AD 660 – 770)

Size class	Size category	Percentage %	Mean diameter in mm
1	300 - 350 mm	36.4	330
2	350 - 400 mm	27.2	370
3	400 - 450 mm	36.4	434

Table 15. Minimum Piece Diameter Analysis (MPDA) – reference collection (1988)

Size class	Size category	Percentage %	Mean diameter in mm
1	300 - 350 mm	27.2	301
2	350 - 400 mm	31.8	380
3	400 - 450 mm	41.0	430

The charcoal from AD 770 is characterised by the same major elements. Typical taxa include *Acacia* spp., *Olea europaea*, *Ptaeroxylon obliquum*, *Diospyros/Euclea* spp., and *Ziziphus mucronata* (Table 6), indicating that the vegetation mosaic was the same. There is a small decrease in the Shannon–Weiner index (Fig. 5). Nine taxa in the older Ntsitsana sample are absent and only two new taxa *Pappea capensis* and *Cussonia* sp., both minor

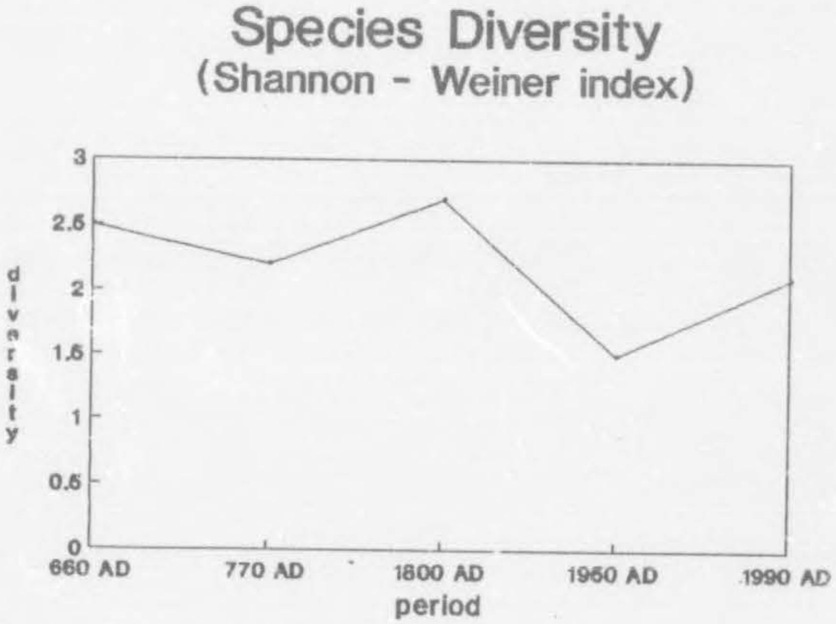


FIG. 5 CHARCOAL DATA: SPECIES DIVERSITY (SHANNON – WEINER INDEX) IN SAMPLES FROM NTSITSANA, NGOSI, NQUKWE, CWERA AND NGOYA

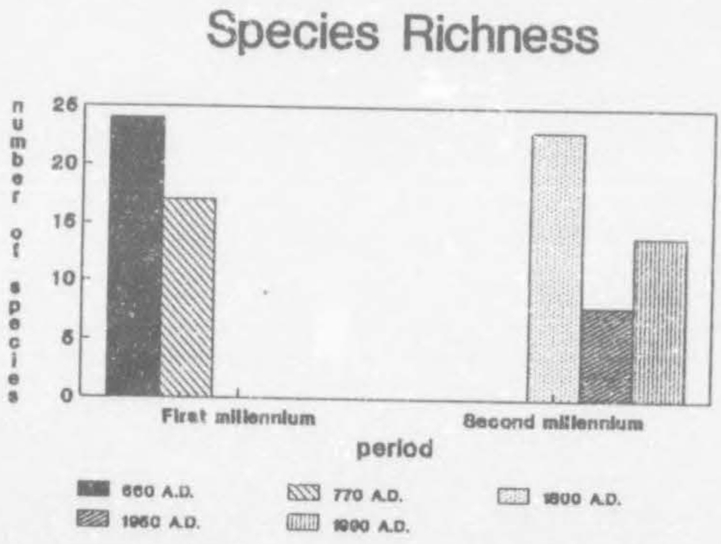


FIG. 6 CHARCOAL DATA: SPECIES RICHNESS IN SAMPLES FROM NTSITSANA, NGOSI, NQUKWE, CWERA AND NGOYA. DATA OBTAINED AT THE LAST TWO SITES ARE COMBINED

elements, are recorded (Table 8). Chi-square scores for the major taxa, show that the probability of the two Ntsitsana samples being drawn from the same population can be rejected at the 0.025 significance level (Table 16). The samples are statistically different although there are similarities in the same major taxa present. The sample from the oldest horizon is perhaps less representative than the sample from the second Ntsitsana horizon because the former includes two pits against four pits in the later horizon (Tables 7 & 8). The sample that includes the large number of features would be expected to incorporate more different taxa. The reverse was found.

Table 16. Chi-square test for most dominant taxa AD 660-770

	660 AD		770 AD		Total
	O_i	E_i	O_i	E_i	
Acacia caffra	26	37.72	52	40.28	78
Acacia karroo/robusta	76	79.30	88	84.70	164
Celtis africana	22	16.44	12	17.56	34
Olea europaea	76	82.20	94	87.80	170
Ptaeroxylon obliquum	48	47.39	50	50.61	98
Tarchonanthus camphoratus	22	17.41	14	18.59	36
Other	112	101.54	98	108.46	210
Total	382		382		790

$$\text{ChiSq} = \frac{(O_i - E_i)^2}{E_i}$$

$$\begin{aligned}
&3.408 + 3.640 + \\
&0.129 + 0.137 + \\
&1.760 + 1.880 + \\
&0.438 + 0.469 + \\
&0.007 + 0.008 + \\
&1.134 + 1.212 + \\
&1.008 + 1.077 = 16.306
\end{aligned}$$

df = 6

Oi = observed number of cases in category i
Ei = expected number of cases in category i
df = degrees of freedom

After a hundred years of settlement some woody species became depleted. However, there was no significant increase in the abundance of invasive taxa like *Acacia* spp. (Table 6). The implication is that firewood collecting had a relatively limited impact on the environment and did not create extensive open conditions in the woody vegetation of the valley.

The results of the EDXA analyses show that the values for the mean vessel diameter, relative conductivity, and vulnerability in the combined Ntsitsana samples are slightly higher than those obtained for the modern reference sample (Table 17). Given the unlimited scale of the EDXA analysis, the small variations in vessel measurements noted are not considered very significant. The results suggest that the soil moisture conditions during the occupation of Ntsitsana and modern times were broadly equivalent.

Table 17. EDXA values for all taxa identified

EDXA value	Period 1988	(AD) 660 - 770
Number of specimens analysed	30	30
Vulnerability (Vuln 1 = MVESD/NVES)	1.62	1.88
Relative conductivity (RELV)	20.8	21.05
Number of vessels per square mm (NVES)	27.9	24.1
Mean vessel diameter (MVESD) in mm	45.2	45.3

Farming was reestablished along the middle reaches of the Mzimvubu River around AD 1800. At the Ngosi site, as at nearby Ntsitsana, Valley Bushveld taxa (17) are well represented in the charcoal (Tables 6 & 13). There is a relatively high frequency of forest species (Tables 9 & 13) that can be explained by Ngosi being situated directly across the river from what is today a small patch of transitional afromontane forest. The values for species richness and diversity are comparable to those of the earliest phase of occupation at Ntsitsana (Figs 5 & 6) and suggest a relatively closed vegetation. However, chi-square scores show these samples to be different from each other at the 0.001 significance level (Table 18). Taxa are more evenly distributed in the Ngosi material than in the Ntsitsana assemblages (Table 6). For example, *Tarchonanthus camphoratus* occurs with the highest frequency at Ngosi but comprises only 11.8% of the total. It is closely followed by *Acacia caffra* (10.2%) and *Olea europaea* (10.2%). All these species are good firewood and *T. camphoratus* burns well even when green (Palmer & Pitman 1972:2155; Coates Palgrave 1983:910).

Charcoal identified in the assemblage from Nqukwe (c. 1950 AD) can be related to Valley Bushveld vegetation as in the other samples studied (Table 10). At Nqukwe there are only eight woody species represented compared to 23 at Ngosi. The difference in species richness may be explained in part by sampling. Charcoal was recovered from only one ash heap at Nqukwe (n=98) while at Ngosi three ash heaps were sampled (n=254). However each of the ash heaps sampled at Ngosi produced a larger range of taxa than the Nqukwe ash heap (Tables 9 & 10). This suggests that the decrease in the species diversity and richness in the Nqukwe sample (Figs 5 & 6)) is real. This decrease in both richness and diversity may relate to the effects of uninterrupted occupation since AD 1800. Chi-square scores indicate that the Ngosi and Nqukwe samples are significantly different at the 0.001 level (Table 19). Marked changes in vegetation that occurred between AD

1800 and AD 1950 include the appearance of *Euphorbia tirucalli* and an almost 50% increase in *Acacia karroo/robusta* (Tables 6 & 10). The increase of these invasive taxa can be explained as a response to the large scale clearance of woody vegetation in the valley. The practice of veld burning to provide year round grazing for livestock may also have contributed to the encroachment of *Acacia* spp. of grassland areas immediately adjacent to Valley Bushveld (*vide* Acocks 1953; Comins 1962; Du Toit 1972b).

Charcoal was also sampled from two modern (AD 1990) ash heaps. These show that *Olea europaea* and taxa of Valley Bushveld vegetation like *Celtis africana* and *Dovyalis caffra* (Tables 6, 11 & 12) are important. However, *Acacia karroo/robusta* decreased from 53% in the 1950's to 23% in the modern sample (Table 6). An unexpected increase in the diversity and richness relative to Nqukwe was found (Figs 5 & 6). Chi-square scores show a difference between these samples at the 0.001 significance level (Table 20).

The increase in richness and diversity in the modern charcoal sample cannot be explained in simple ecological terms. The social changes in the valley also need to be taken into account. In areas where a dispersed settlement pattern has been maintained only dry firewood is usually collected. This is because dry wood is available and tribal laws forbid the chopping of green wood. In areas where more people have been concentrated in betterment villages since the 1960's there has been disintegration of traditional authority systems (McAllister 1991) and the restrictions on the chopping of green wood do not apply. This may lead to overexploitation of the vegetation.

Table 18. Chi-square tests for the most dominant taxa AD 660 & AD 1800

	660 AD		1800 AD		Total
	O_i	E_i	O_i	E_i	
Acacia caffra	26	37.72	26	23.09	52
Acacia karroo/robusta	76	79.30	22	53.40	98
Celtis africana	22	16.44	12	18.76	34
Olea europaea	76	82.20	26	21.65	102
Ptaeroxylon obliquum	48	47.39	18	12.99	66
Tarchonanthus camphoratus	22	17.41	30	21.65	52
Other	112		120		
Total	382		254		

$$\text{ChiSq} = \frac{(O_i - E_i)^2}{E_i}$$

3.408 + 0.950 +
0.129 + 47.850 +
1.760 + 6.316 +
0.438 + 2.268 +
0.007 + 5.011 +
1.134 + 8.352 +
1.008 + 7.777 = 86.408

df = 6

Oi = observed number of cases in category i
Ei = expected number of cases in category i
df = degrees of freedom

Table 19. Chi–square test for most dominant taxa AD 1800–1950

	1800 AD		1950 AD		Total
	O_i	E_i	O_i	E_i	
Acacia caffra	26	23.09	6	8.91	32
Acacia karroo/robusta	22	53.40	52	20.60	74
Celtis africana	12	18.76	14	7.24	26
Olea europaea	26	21.65	4	8.35	30
Ptaeroxylon obliquum	18	12.99	0	5.01	18
Tarchonanthus camphoratus	30	21.65	0	8.35	30
Other	120	102.47	22	39.53	142
Total	254				352

$$\text{ChiSq} = \frac{(O_i - E_i)^2}{E_i}$$

0.950 + 0.366 +
47.850 + 18.462 +
6.316 + 2.437 +
2.268 + 0.875 +
5.011 + 1.934 +
8.352 + 3.223 +
7.777 + 3.000 = 108.820

df = 6

Ci = observed number of cases in category i
Ei = expected number of cases in category i
df = degrees of freedom

Table 20. Chi-square test of most dominant taxa AD 1950-1990

	1950 AD		1990 AD		Total
	O_i	E_i	O_i	E_i	
Acacia caffra	6	5.26	10	10.74	16
Acacia karroo/robusta	52	32.23	46	65.77	98
Celtis africana	14	9.87	16	20.13	30
Olea europaea	4	6.58	16	13.42	20
Ptaeroxylon obliquum	0	1.32	4	2.68	4
Tarchonanthus camphoratus	0	5.26	16	10.74	16
Other	22		92		114
Total	98		298		298

$$\text{ChiSq} = \frac{(O_i - E_i)^2}{E_i}$$

0.051 + 0.104 +
5.944 + 12.130 +
0.849 + 1.732 +
0.495 + 1.010 +
0.645 + 1.315 +
2.578 + 5.262 +
3.136 + 6.400 = 41.650

df = 6
2 cells with expected counts less than 5.0

Oi = observed number of cases in category i
Ei = expected number of cases in category i
df = degrees of freedom

Table 21. Chi-square test for dominant taxa - all periods

	660 AD		770 AD		1800 AD		1950 AD		1990 AD		Total
	O_i	E_i	O_i	E_i	O_i	E_i	O_i	E_i	O_i	E_i	
Acacia caffra	26	34.16	52	36.48	26	22.71	6	8.76	10	17.88	120
Acacia karroo/robusta	76	80.84	88	86.34	22	53.75	52	20.74	46	42.32	284
Celtis africana	22	21.63	12	83.11	12	14.83	14	5.55	16	11.33	76
Olea europaea	76	61.48	94	65.67	26	40.88	4	15.77	16	32.19	216
Ptaeroxylon obliquum	48	34.16	50	36.48	18	22.71	0	8.76	4	17.88	120
Tarchonanthus camphoratus	22	23.34	14	24.93	30	15.52	0	5.99	16	12.22	82
Other	112	126.38	98	134.99	120	84.04	22	32.42	92	66.17	444
Total	382		408		254		98		200		1342

$$\mathrm{ChiSq} = \frac{(O_i - E_i)^2}{E_i}$$

3.475 + 0.871 + 0.476 + 6.600 + 1.948 +
0.319 + 47.120 + 18.757 + 0.032 + 0.290 +
1.928 + 12.866 + 0.395 + 5.338 + 0.006 +
8.143 + 8.788 + 5.418 + 12.222 + 3.427 +
10.778 + 8.763 + 0.978 + 5.008 + 5.609 +
1.159 + 5.988 + 13.509 + 4.792 + 0.077 +
10.083 + 3.351 + 15.391 + 10.134 + 1.637 = 235.639

df = 24

Oi = observed number of cases in category i
Ei = expected number of cases in category i
df = degrees of freedom

The implication is that the AD 1950 (pre-resettlement period) charcoal samples represent mainly dry firewood collecting and the modern charcoal sample green firewood collecting. The wider range of plants available through cutting living trees gives an apparent increase in richness and diversity to the relevant charcoal sample. However, the cutting of firewood is part of the progressive environmental degradation that is taking place in the area.

CONCLUSIONS

The results of this study strongly suggest that the present vegetation mosaic of the Mzimvubu Valley has persisted for the last two thousand years. Nevertheless the charcoal data clearly indicate that the activities of early farmers, starting 1400 years ago, had a detectable impact on the woody vegetation. This impact is shown by the change in the richness and diversity of woody plants represented in the series of charcoal samples collected. Statistical tests lend confidence to the contention that the changes in the composition of the woody vegetation are significant. Selection was for wood types of high calorific value especially *Acacia* spp. and *Olea europaea*. Between the earliest settlement in the last millennium and that of the last few hundred years there was a long period of either no settlement or very low density settlement that allowed the vegetation to recover from disturbance. The impact of human activities on the vegetation in the past few hundred years has been progressively greater. Today, woody plants are intensively exploited for fuel and the indiscriminate cutting of green wood has become the norm. The impact of human subsistence activities have not been sufficient to totally destroy the natural "climax" vegetation but, with an increasing population and more demands on cheap natural resources, this is not an inconceivable future scenario.

SUMMARY

Charcoal was recovered from three excavated sites and analysed. The results indicate that the major vegetation types have persisted in the area over the last 1400 years. Dense Valley Bushveld vegetation was present at the time of initial settlement (AD 660) however, a small but significant decrease in the diversity of woody species occurred after 100 years of settlement. After almost 1000 years the area was reoccupied in about AD 1800. The impact of historic settlement on the vegetation has been very marked. The natural thicket vegetation has been extensively invaded by pioneer woody species like *Acacia karroo* and the environment has become severely degraded. Woody litter is no longer sufficient to provide firewood and the modern practice of felling shrubs and trees for firewood is having a profoundly negative ecological impact.

6 PHYTOLITHS

INTRODUCTION

The analysis of phytoliths from archaeological contexts in southern Africa is at a pioneering stage. Such studies have potential to provide information for archaeological and palaeoecological studies. Schuurman (1988) undertook a study of the differences between phytoliths of C3 and C4 grasses. The results reported here are an attempt to explore some additional applications of phytolith analysis. This study is of interest in providing information on relative changes in precipitation and in indicating the kinds of domestic livestock kept by the early farmers at Ntsitsana.

PHYTOLITH PRODUCTION IN PLANTS

Silica occurs as a monosilic acid ($Si(OH)_4$) in soils with a pH of less than 9.0 (O'Reagan & Mentis 1989). Monosilic acid in solution is absorbed through the root system of a plant, carried through the vascular system and deposited as hydrated silica ($SiO_2.nH_2O$) in cells or intracellular cavities of the plant (Jones & Handreck 1969). The ultimate shape of the silica secreted in this way is determined by the structural elements of the plant. The major sites of silica deposition are cellular and intracellular. Distinctions may be made between silica cells and other silica bodies, such as hair cells, plates, and prickle cells in plants. In this study phytoliths refer to all opal or silica bodies and the term is used in a broad generic sense (Rovner 1983).

There is considerable variation in the quantity of silica deposited in plants. Grasses however, appear to be the group with the greatest capacity to accumulate silica (O'Reagan & Mentis 1989). Jones & Beavers (1964) hold that grasses produce and recycle into to the soil more kilograms of biogenic silica per hectare than trees. Phytoliths have a low resolution for identification at the specific or generic levels but they can be used at the higher taxonomic level to distinguish between tribes of grasses. The potential to distinguish between temperate (C3) tribes and tropical (C4) tribes of grasses alone makes phytoliths useful in palaeoenvironmental studies (Rovner 1983).

RESEARCH DESIGN

Initially, the classification system developed by Schuurman (1988) was used to determine whether shifts in the proportions of C3 and C4 grasses had occurred in the last some 2 000 years. Schuurman's system is based on 40 grass species which were collected from a range of environmental settings in South Africa but included only a limited number of the grass species which occur in Transkei. It was beyond the scope of this study to make a comprehensive reference collection of the grass phytoliths for the study area and as a compromise "fossil" assemblages of phytoliths were compared with the assemblages found in the dung of modern domestic animals. The phytolith assemblages of the modern dung compared favourably with Schuurman's (1988) classification scheme. Although the taxonomic resolution of the phytolith analysis is reduced by the lack of reference materials, the approach adopted can be shown to have merit.

Phytoliths in the plants ingested by herbivores pass through the digestive tract and are expelled with the animals feces (Rovner 1983; O'Reagan & Mentis 1989). As silica bodies, phytoliths are not necessarily destroyed by burning and so the extensive burnt dung deposits at Ntsitsana were an obvious target for phytolith analysis. Phytoliths from these samples derive from the grasses available to the stock kraaled there some 1 200 years ago. Phytoliths extracted from samples of modern sheep, goat and cattle dung, on the other hand, represent the grasses that are available to and preferred by livestock grazing there today.

Similarities and differences between the "fossil" and modern phytolith assemblages can be given meaning by referring to the ecology of the domestic species involved. Under normal conditions cattle are predominantly grazers, sheep are mixed feeders, and goats are browsers (Roux 1968). Sheep, and especially cattle dung, could therefore contain a different quantity and variety of grass phytoliths than goat dung. The animals, from which the phytolith samples were obtained, all had access to the same grazing areas although sheep were only rarely observed in Valley Bushveld. In similar environmental settings these domestic animals may utilise different plant species and even where grazing on the same plants they may selectively use different parts and foliage levels (Roux 1968; du Toit 1972a; Aucamp 1976; Zimmermann 1978; Grunow 1980). The latter point is important because phytolith morphology may show wide variation depending upon its location in different tissues of the same plant (Rovner 1983; Brown 1984). Thus one would expect to find differences in the phytolith composition of dung from cattle, sheep and goats and phytolith analysis gives us a basis for investigating which stock were kept on an early farming settlement.

An assumption underlying this study is that livestock in the first millennium AD and in modern times followed similar but not necessarily identical grazing patterns. Some minor differences between the two phytolith assemblages is to be expected as the breeds of stock were different. Liversidge (1972) has shown that breeds of sheep may differ in their diet and it is known that the sheep and other livestock kept by early farming communities were not the same breeds as the modern European derived types (Epstein 1971; Voigt 1983). On the other hand major differences between "fossil" and modern phytolith samples could be predicted if there had been any large scale changes in vegetation mosaic. Vogel et al. (1978) indicated that between 95% and 100% of the grasses occurring in dry river valleys and between 75% and 95% of grasses occurring in the higher altitude areas of south eastern Africa are C4 species. A survey of the vegetation has indicated that the study area is presently dominated by C4 grasses (Granger 1992). It can be assumed that phytoliths typical of C4 species should dominate modern dung samples. Therefore if any marked difference in the percentage of C4 grasses occurred in the past this should be discernible in a comparison between samples of modern and "fossil" dung.

The validity of the approach to phytolith analysis outlined here is not in question. The field sampling and analytical procedures adopted, however, would need modification to provide conclusive results. As a pilot study, attempting to develop new applications for phytolith analyses, the interest is as much in the potentials of the approach as in the specific results. The study of phytoliths was not a main focus of this research project. Such a study would have required a different research design involving the collection and preparation of a more comprehensive comparative collection.

SAMPLING OF PHYTOLITHS

THE REFERENCE COLLECTION

Faunal remains from Ntsitsana include goats, sheep and cattle (Chapter 8) and samples of the dung of the modern breeds of these animals kept in the study area were collected. In an attempt to reduce possible bias due to the feeding of individual animals the samples which were examined were drawn from a pooled collection of droppings for each species. Cattle dung was sampled at five and goat dung at four diff[illegible]tions in Valley Bushveld. Sheep dung was sampled at five different localities, all of them in the higher altitude Southern Tall Grassveld as sheep were never observed in Valley Bushveld.

Local informants maintain that the river valleys harbour a variety of diseases specific to sheep. This opinion is supported by Jacobson (1970) who states that diseases such as bluetongue and heartwater occur extensively in bushveld and lower lying valley slopes. Another factor which may be responsible for the absence of sheep in Valley Bushveld is the height of the herbage. Sheep are primarily ground level grazers (Bransby 1980). They are selective in the areas they graze and show a definite preference for burnt areas (Grunow 1980) such as the higher altitude grassland areas of Transkei where veld fires are common (Skead 1987) and short and new grown grasses abundant. Valley Bushveld on the other hand does not have a continuous grass undercover and in open patches where grasses are more abundant the stems are usually quite tall because fires are rare (Trollope 1982; Trollope & Tainton 1986). Consequently sheep prefer grazing on the higher-lying grassland areas of Southern Tall Grassveld which occur on the valley margins and interfluves adjacent to Valley Bushveld.

THE ARCHAEOLOGICAL SAMPLE

Phytoliths recovered from the archaeological deposits were obtained mostly from the burnt dung area at Ntsitsana. Two squares of 1 m x 1 m each were excavated in the large kraal feature. Associated potsherds indicated that the two squares represented different occupational periods; Square 1, c. AD 660, and Square 2, c. AD 770. Samples were collected at three levels in Square 1, 100–200 mm, 300–400 mm and 600–700 mm. Square 2 was sampled at depths of 100–200 mm and 300–400 mm. It was logical to expect that the ashy deposits of "rubbish" pits would also contain phytoliths. The ashy fill of two pits was sampled to test this possibility. Pit 1 was sampled at a depth of 100 mm which relates to the earlier occupational period of Ntsitsana. Pit 2 was sampled at a depth of 150 mm and is dated to AD 770.

PREPARATION OF THE SAMPLES

THE REFERENCE COLLECTION

A number of methods have been developed to extract silica particles from plants (Rovner 1983). All fall into one of two general categories, dry-ashing and wet-ashing. A dry-ashing method was followed for extracting phytoliths from the modern dung samples examined in this study. Although there is evidence to indicate that high temperatures used in dry-ashing can alter phytolith morphology significantly (Jones & Milne 1963:210–217; Jones & Beavers 1964:414), this method simulated the conditions which would have occurred in hearth fires or the burning of structures (Rovner 1983:239). The burnt dung area at Ntsitsana that provided most of the "fossil" phytolith samples represents a series of livestock kraals fired on abandonment and the samples recovered from the pits occurred in burnt ashy deposits. Phytoliths prepared for the reference collection and those occurring in the deposits therefore received similar heat treatment and any bias in the results due to the extraction method is considered minimal.

The following dry-ashing method was used. Modern dung samples were wrapped in tin foil and heated in numbered crucibles in a muffle furnace at 500°C for three hours. A fixed dry weight of fine ashed dung (0.4 g per sample) was placed in a marked test tube. Silicon oil (six drops) with a refractive index of 1.5 was then added to the ash and stirred with a glass rod until the ash was dispersed. Two drops of this mixture were placed on a microscope slide and covered with a cover slip. Although particles other than phytoliths were retained on the slide this method was adopted to ensure that no phytoliths were washed away by any more elaborate cleaning process. Sufficient phytolith material for counting purposes was contained in two drops of the mixture.

THE "FOSSIL" MATERIAL

Methods developed for the extraction of phytoliths from a soil matrix (Armitage 1975; Rovner 1983; Fredlund 1986; Piperno 1988) involve procedures that are similar to those used to extract pollen from soil. In this study, however, the archaeological deposits sampled for phytoliths are primarily burnt dung and ashy material and so dilution by soil mineral matter was not a problem. Trial and error showed that an adequate concentration of phytoliths could be obtained by preparing the fossil samples in the same way as the modern dung samples. The samples of burnt dung and ash from the pits were lightly ground using a pestle and mortar (*vide* Lanning et al. 1958) and the fine ash component was separated and silicon oil added.

MICROSCOPY

Phytoliths were examined with a Leitz Laborlux 11 microscope at a magnification of 400 X. Phytolith size was measured with a micrometer eyepiece. Counts of 400 phytoliths per sample were made in order to determine the relative frequency of phytolith types.

IDENTIFICATION OF PHYTOLITH TYPES

Eleven morphological types were identified and these form four main groups, namely (1) bilobal, (2) saddle form, (3) oblong shaped, and (4) container shaped (Fig. 7). A brief description of each group and the types which form each group is given in Table 22. The classification developed is a simplification of that proposed by Schuurman (1988). All the various types of phytoliths found in both the reference collection and the archaeological samples could be classified and assigned to one of the main groups. The merits of the classification are obvious in that the results make it possible to distinguish clearly between the modern dung of different domestic herbivores. As noted the purpose in this study was not to identify the species of grass eaten but to characterise the phytolith assemblages representative of the different kinds of herbivores.

Table 22. Phytolith groups and morphological types (Fig. 7)

GROUP	MORPHOLOGICAL TYPE	DESCRIPTION
1. Bilobal	Round	Lobes on either side of dumbbell completely developed - roundish shape.
	Blunt	Lobes on either side of dumbbell blunt.
	Riffled	Blunt lobes on either side of dumbell, rippled shank.
	Cross	Cross shape - four edges concave - length < 2 X width.
2. Oblong	Smooth	Length is > 2 x width - smooth edge (definitely longer than 10 um).
	Rippled	Length is > 2 x width - both edges rippled.
	Backed rippled	Length is > 2 x width - one edge rippled.
3. Saddle	Square	Square shape - size ± 5um x 5 um.
	Rectangular	Rectangular shape - size ± 10 um x [illegible] um.
4. Container	Square shape	Consists of two parts, in middle is a silicified thickening with a thin cover on the outside (squarish).
	Round	Same as above, but cover on the outside is roundish in shape.

RESULTS

THE REFERENCE SAMPLE

The relative frequencies of phytolith types identified in the modern dung of three domestic animal species are given as percentages in Table 23. The variability in phytolith

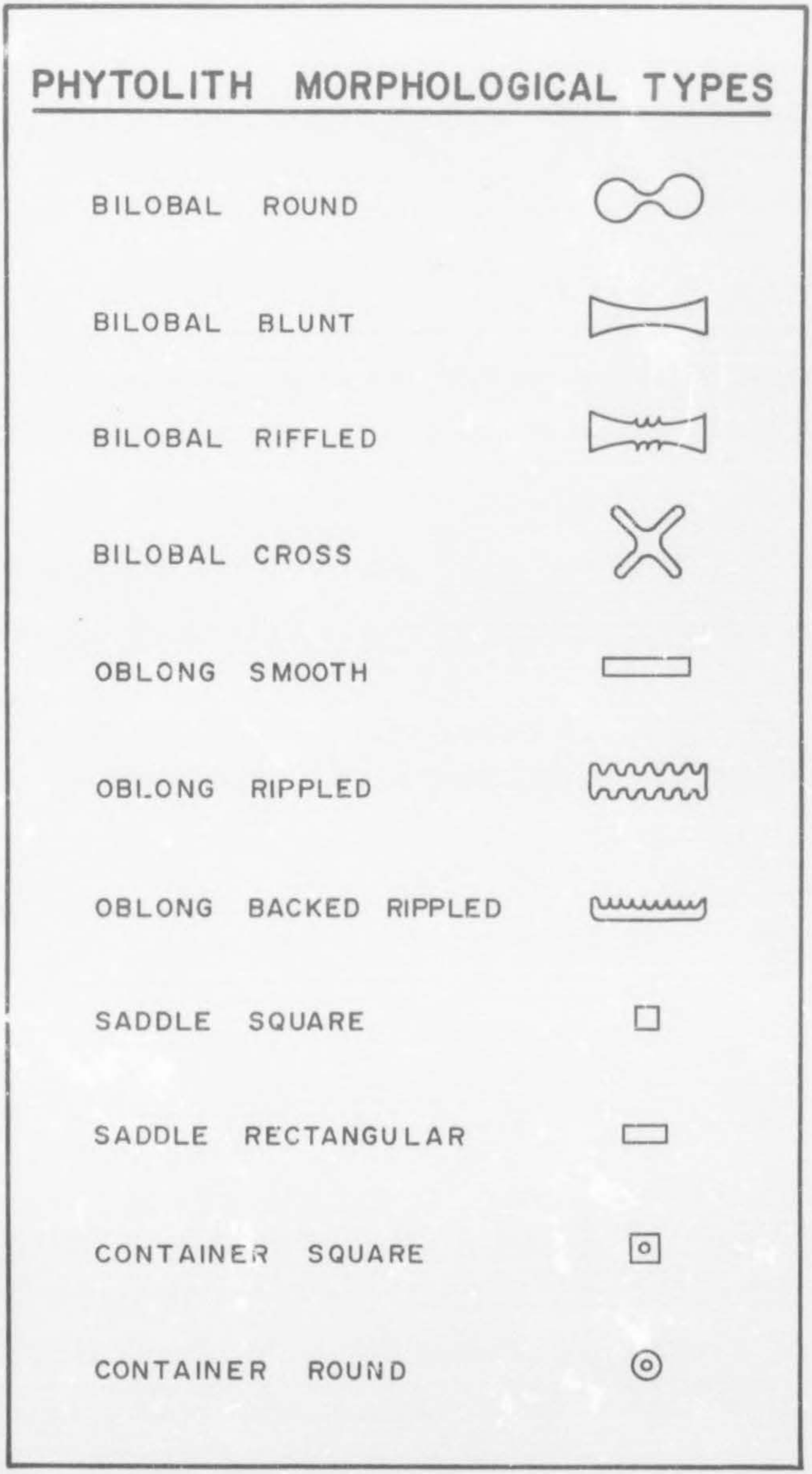


FIG. 7 PHYTOLITH MORPHOLOGICAL TYPES IDENTIFIED IN DUNG SAMPLES

composition between sample localities was found to be very low for all species and the results are therefore discussed in terms of mean values.

Table 23. Relative percentages of most dominant phytolith morphological types in modern dung.

Sample	Number of localities sampled	Range in Rel.Freq (%) Bilobal	Other	Mean Bilobal	Other	Vegetation Type (after Acocks 1953)
Cattle dung	5	95-99%	1- 5%	98%	2%	Valley Bushveld
Sheep dung	5	63-70%	30-37%	62%	38%	Southern Tall Grassland
Goat dung	4	20-24%	76-80%	22%	78%	Valley Bushveld

A distinct pattern emerged for each of the species. Cattle dung was found to be characterised by a predominance of the bilobal-blunt phytolith type (93%), although bilobal-round phytoliths also occurred (5%). A further distinguishing feature of cattle dung was the apparently low diversity of phytoliths with only three of the eleven morphological types occurring.

The most notable feature of the sheep dung samples was the high percentage of bilobal-round phytoliths (62%) present. Bilobal-blunt phytoliths, so characteristic of the cattle dung, were completely absent in the sheep dung. Noteworthy also was the relatively high diversity; six morphological types were identified but most occurred in low frequencies.

Four morphological types were identified in goat dung. The relative percentages (Table 23) show that unlike cattle and sheep dung no phytolith type was dominant. The saddle–rectangular category were the most numerous (40%) and the container–round shape type (33%) the next most numerous. Some morphological types found in goat dung were not found in cattle or sheep dung and may have derived from woody vegetation only exploited by the goats (*vide* Piperno 1985; Scurfield et al. 1974) rather than from grasses. The data indicate that the modern sheep, goat and cattle dung samples differ significantly in phytolith composition. These samples were all collected in October so it remains to be shown whether such differences hold for all months of the year but such can be inferred from the study of fossil materials.

It has been shown that the ratios of three phytolith categories, bilobal, saddle, and oblong shaped, can be used to distinguish between C3 and C4 grasses (Schuurman 1988). A predominance of bilobal and saddle form phytoliths is indicative of C4 grasses. C3 grasses are characterised by a large percentage of oblong shaped phytoliths with bilobal phytoliths occurring in low frequencies. When present bilobal phytoliths in C3 grasses are usually of the bilobal biunt type. Container shaped phytoliths are also present in C3 grasses according to Schuurman (1988). The modern sheep and cattle dung was obtained from areas characterised by a predominance of C4 grasses (Vogel et al. 1978). Hence it was expected that these modern samples would comprise mainly bilobal phytoliths and this is borne out by the data presented in Table 23. The oblong phytoliths which make up 30% of phytoliths found in the sheep dung are absent in the cattle dung and this is possibly an indication that more C3 grasses were grazed by the sheep.

THE BURNT DUNG AREA

Square 1

Phytoliths from Square 1 in the burnt dung area are associated with Ntsitsana\Msuluzi type ceramics (c. AD 660). The percentage frequency of types obtained from different depths in Square 1 is shown in Table 24. Although the phytolith ratios are not constant throughout the profile the overall pattern is nevertheless consistent. Bilobal round phytoliths predominate (58%–76%) and bilobal blunt phytoliths are common (18%–26%). Other phytolith types occur but with very low frequencies. A low variability in phytolith types between the different samples was obtained and results are discussed in terms of a calculated mean value.

It is evident that the percentage of bilobal phytoliths (both round and blunt) is significantly higher than all the other types combined (Table 24). This pattern points to a predominance of C4 grasses at around AD 660. A close correspondence exists between all the samples from square 1 (58–73%) and the modern sheep dung in the dominance of bilobal round phytoliths whereas they comprise only 4% of modern cattle dung. Oblong phytoliths, indicative of C3 grasses, do occur in the burnt dung of Square 1, but the [illegible] value of 8% is low when compared to the 30% found in the modern sheep dung.

Table 24. Main phytolith groups in sample from Square 1, Ntsitsana kraal area

Sample no	Excavated depth	Pottery typology	Dominant phytoliths		
			Percentage frequency		
			Bilobal round	Bilobal blunt	Other
1	100-200 mm	Ntsitsana\Msuluzi (AD 660)	55%	28%	17%
2	100-200 mm	"	55%	30%	15%
3	300-400 mm	"	63%	27%	10%
4	300-400 mm	"	60%	31%	9%
5	600-700 mm	"	70%	19%	11%
6	600-700 mm	"	68%	19%	13%

Square 2

The samples from Square 2 in the burnt dung area can be dated to the period AD 770 by the associated pottery. Phytolith samples from different depths show some variability in the frequency of types present (Table 25) but bilobal phytoliths (both round and blunt), indicative of C4 grasses, dominate. It is not possible to relate these samples exclusively to either sheep or cattle dung although it would seem that the latter might predominate because although the bilobal round type which characterises modern sheep dung is relatively well represented bilobal blunt phytoliths, characteristic of cattle dung, have the highest frequencies (Table 25).

Table 25. Main phytolith groups obtained from Square 2, Ntsitsana kraal area

Sample no	Excavated depth	Pottery typology	Dominant phytoliths Percentage frequency		
			Bilobal round	Bilobal blunt	Other
1	100-200 mm	Ntsitsana\Ndondondwane (AD 770)	41%	41%	18%
2	100-200 mm	"	36%	42%	22%
3	300-400 mm	"	26%	52%	22%
4	300-400 mm	"	26%	50%	24%

THE PITS

Phytolith frequencies from pits 1 and 2 were expressed as mean values. The bilobal group is dominant in samples belonging to the period AD 660 (Pit 1) indicating the presence of C4 grasses (Table 26). There is a higher frequency of bilobal round phytoliths (58%) relative to the bilobal blunt category (19%) suggesting sheep were abundant. Results are thus similar to those obtained from the burnt dung dated to AD 660. Phytoliths from Pit 2, dated to AD 770, show an equal representation of the bilobal round (50%) and the saddle square (50%) category. No other types occurred. Schuurman (1988) noted that C4 grasses may also be characterised by a high frequency of saddle shaped phytoliths. It is possible that the pit-fill ash of Pit 2 is burnt material like thatch grass rather than burnt dung and this may account for the somewhat anomalous phytolith spectrum. There is potential to study phytoliths from features other than kraals for new kinds of archaeological information. It was beyond the scope of the present study to do more than indicate some possible directions for future research.

Table 26. Percentage frequency of main phytolith groups obtained from Pits 1 & 2.

Sample no	Feature	Sampling depth	Period	Dominant phytolith groups Percentage frequency Bilobal round	Bilobal blunt	Other
1	Pit 1	100 mm	AD 660	56%	20%	24%
2	Pit 1	100 mm	"	60%	20%	20%
3	Pit 2	300 mm	AD 770	47%	-	53%
4	Pit 2	300 mm	"	53%	-	47%

PHYTOLITH SIZE - MEASUREMENTS

Measurements of the size of the phytoliths from both the modern and archaeological samples produced a distinct pattern over time. Phytoliths from the archaeological deposits (burnt dung area & pits) were on average larger than those from modern sheep and cattle. The phytolith lengths are presented in Table 27. The differences in size are very marked.

Table 27. The range and mean length of the most dominant phytolith types identified in the archaeological deposit and in modern dung

Phytolith type	Archaeological deposit range	Archaeological deposit mean length	Modern dung range	Modern dung mean length
Bilobal round	20-30 um	26.5 um	10-20 um	19.8 um
Bilobal blunt	20-28 um	21 um	10-20 um	16 um

Rovner (1983) indicated that moisture stress in plants leads to the production of smaller phytoliths. Schuurman (pers. comm.) has analysed the size differences of phytoliths in *Themeda triandra* from different rainfall regimes and her preliminary work indicates that phytolith size may be a useful precipitation indicator under South African conditions. The modern sheep and cattle dung u[illegible]parison in this study was collected early in the growing season (October 1988) but Rovner (1983) suggests that collection of reference material should be made at the end of the growing season to ensure that mature silica bodies are obtained. However, it has yet to be established that there is a significant relationship between phytolith size and maturity. It is probable that the phytoliths obtained from the archaeological deposits represent a wide spectrum of silica bodies at different stages of maturity. Ideally the reference collection should represent each month of the annual cycle to ensure that the samples are comparable. As there was no control for seasonal differences in phytolith maturity the data obtained here need confirmation. In this study an investigation of seasonal and a real variation in phytolith size was not justified but it would be warranted in any future study. Precipitation is a parameter that is not easily measured for times past.

DISCUSSION AND CONCLUSION

This chapter explores the potential value of the study of phytoliths from Iron Age contexts. The results indicate considerable promise and there is a need for a more comprehensive programme of research following the approaches adopted.

The ratio of diagnostically different types of phytoliths shows that C4 grasses were dominant in the environs of Ntsitsana between AD 660 and AD 770 as in the present (Granger 1992). The presence of C4 grasses is indicative of seasonal hot climates with a summer rainfall.

The greater phytolith length measured for the first millennium sample may indicate higher precipitation during the seventh and eight centuries AD but the results are not conclusive because of lack of information on seasonal effects on phytolith size. However, the length differences observed may well reflect differences in precipitation as the analysis of charcoal samples from Ntsitsana give similar results.

It is difficult to differentiate between different livestock species using chemical analysis of fossil dung (Deacon et al. 1977; Butterworth 1979). The direct correlation between a predominance of bilobal round phytoliths and sheep dung and bilobal blunt phytoliths and cattle dung found in this study suggests an alternative approach. Evidence supporting the idea that the burnt dung deposits at Ntsitsana can indeed be associated with sheep (AD 660) and cattle and sheep (AD 770) husbandry is provided by the faunal material recovered from the site.

SUMMARY

The analysis of phytoliths from Ntsitsana is an exploratory study which has indicated directions for further research. The presence of C4 grasses in the environs of Ntsitsana during the first millennium is indicated and the environment may have been more dominantly C4 at that time. The evidence for possible higher rainfall during the period AD 660–770 relative to the present is inconclusive because the control samples for phytolith size represent a period when these would be immature. It is in indicating the kinds of domestic animals herded in the past that phytolith studies make their greatest contribution to understanding early farmers at Ntsitsana. Sheep were probably farmed exclusively at the initial stage whilst cattle first appeared a hundred years later.

7 SEEDS

INTRODUCTION

Seeds were recovered during the excavations by dry sieving and by water flotation. The bulk of the seeds came from pits at Ntsitsana. Apart from a carbonised maize cob in ash heap 4 on the Ngosi site the excavation of ash heaps produced no seeds. These materials provide some supplementary information on past environments in the north eastern Transkei.

Identification of the seeds was undertaken by J. Allison of the Directorate of Plant and Seed Control, Department of Agricultural Economics and Marketing, Pretoria. The identifications are listed in Table 28. Many attributions are at generic level because of poor preservation.

THE FIRST MILLENNIUM (AD 660–770)

There is no direct evidence for the cultivation of cereals at Ntsitsana in this period. This can be ascribed to poor conditions for preservation. However, given the size of the site (27 hectares), it is anamolous that there are so few grindstones. Grindstones are indirect evidence for cereals. It is assumed that the same cereals as were grown in Natal such as *Eulisine coracana*, *Pennisetum glaucum* and *Sorghum* spp. (Maggs & Michael 1976; Maggs 1984a, 1984b; Maggs & Ward 1984). Three *Citrullus* sp. seeds from Pit 1 (AD 660), indicate that wild or perhaps cultivated melons were growing at the site.

With the exception of Pit 4 all the pits excavated contained seeds of wild plants. They include the seeds of grasses, small herbs and trees and some fruits that are edible (Table 28). Occurrence in a pit does not necessarily imply any economic importance because some seeds probably represent chance inclusions. Others may be later introductions through disturbance of the deposit (see Maggs 1984a; Maggs & Ward 1984). The occurrence of *Opuntia* sp. 100 mm below the surface in Pit 3 is almost certainly a case in point (Wells et al. 1986). Remains of *Medicago* sp. from 150 mm below surface in the same feature is possibly also a later inclusion although *Medicago polymorpha* has been identified from a precolonial context at Scotts Cave in the Gamtoos Valley (Wells 1965; Deacon 1967). Sheep have been identified at Scotts Cave and it has been argued that burs of this weed were dispersed by small stock. An association with sheep at Ntsitsana is also possible.

The presence of *Urochloa* sp. in Pit 5, at depths of 100, 200, & 260 mm below the surface, is most significant. It is a grass that is a widespread weed and pioneer in disturbed areas (Chippindal & Cook 1976) and provides winter grazing in riverine flats where it replaces less palatable species under heavy grazing (Tainton et al. 1976). Pioneer grasses like *Urochloa* would have become established on cleared agricultural lands and might also provide evidence for heavy grazing and a degraded local environment at Ntsitsana. Progressive degradation of the environment over the 100 or so years of farming is a likely scenario on other lines of evidence.

It is interesting to note that some woody species such as *Olea europaea*, *Dovyalis caffra*, and *Diospyros* spp. which have edible fruits and which were recorded in the charcoal remains were not represented in the seed material. In contrast, the tree Maerua sp. was identified in the seed material but not in the charcoal assemblage. Seed and charcoal identifications provide complementary information on the plants in the palaeoenvironment.

THE SECOND MILLENNIUM (c. AD 1820)

A carbonised maize cob (*Zea mays*) was found in Ash Heap 4, 130 mm below surface on Ngosi. The radiocarbon date of 160 ± 50 BP (Pta-4688) for this occurrence accords with the earliest travellers reports of maize in Transkei. At the turn of the eighteenth century Hubberly (in 1782) (Kirby 1953) and Van Reenen (in 1803) (Blommaert & Wiid 1937) noted that maize was being cultivated by the Mpondo and Xhosa, along the coast of Transkei.

According to Bryant (1929:376), the only crops grown by the Bhaca prior to the coming of the Europeans at the beginning of the 19th century were *Eleusine coracana*, and *Sorghum caffrorum*. Maize was cultivated much later. If Ngosi is in fact a Bhaca homestead as seems likely (*vide infra*), then maize was cultivated by the Bhaca earlier than Bryant suggests. The less likely possibility is that maize was traded or obtained by raiding Mpondo neighbours (Makaula 1988). The Mpondo are known to have been involved in extensive cultivation during the period of Bhaca settlement in Transkei (Beinart 1980, 1982).

Table 28. Seeds identified from dry sieving and flotation samples. Information on usage drawn from Tainton et al. 1976; Moll 1981; Fox & Norwood Young 1983; Coates-Paigrave 1984; Maggs 1984a & Maggs & Ward 1984)

Identification	Description	Possible use & comments	Provenance
Acacia sp.	thorn trees	good firewood	Pit 3 (AD 770)
Aizoon cf. *glinoides*	herb	leaves are used as spinach	Pit 1 (AD 660) Pit 5 (AD 770)
Blepharis integrifolia	shrublet	dominant in eroded areas	Pit 3 (AD 770) Pit 5 (AD 770) Pit 6 (AD 770)
Citrullus sp.	melons, wild & cultivated	*C. lanatus* is an important cultivated melon. Melon stays fresh for a whole year	Pit 1 (AD 660)
Maerua sp.	tree	*M. caffra* and *M. nervosa* occur in study area, fruit of both is edible & available from October to December	Pit 2 (AD 770)
Medicago sp.	weed	exotic-introduced by sheep	Pit 3 (AD 770)
Opuntia sp.		prickly pear exotic cactus	Pit 3 (AD 770)
Pappea capensis	tree	fruits are edible and available from February to July. Seeds are an oil source	Pit 2 (AD 770)
Rhamnus sp.	shrub	fruits are edible and available from December to June	Pit 5 (AD 770)
Urochloa sp.	grass	typical of disturbed areas	Pit 5 (AD 770)

SUMMARY & CONCLUSION

The sample of seed remains is small (N=139) but includes species that are edible and that are environmental indicators. *Citrullus* sp. is the only domesticant but *Medicago* is a weed associated with sheep farming and *Urochloa* is a grass associated with disturbances and environmental degradation. A maize cob from an early nineteenth century context provides direct evidence for maize cultivation in Transkei.

8 FAUNAL REMAINS

INTRODUCTION

Identifiable faunal remains were recovered from the excavation of the Ntsitsana site only. This faunal assemblage was sorted preliminarily and the identifications were made by J. S. Brink of the National Museum, Bloemfontein. Although the sample is small (Table 29), it provides some insight into the diet of the early farmers at Ntsitsana and the environmental conditions at the site.

COMPOSITION

Faunal remains recovered from excavated features belonging to the period AD 660 are predominantly of small stock (Table 29). Although a large proportion of the ovicaprid material could not be identified to species, sheep remains (*Ovis aries*) could be positively identified. Goat (*Capra hircus*) was not identified in this early material. A vertebra, tentatively identified as being that of domesticated pig (*Sus domesticus*), was found in Pit 7, 400 mm below surface but the identification needs to be confirmed by further finds. Some bone fragments show etching by stomach acid indicating regurgitation, possibly by domesticated dogs.

Cattle (*Bos taurus*) were represented in the deposits dated to AD 770. All the pits of this period produced some cattle remains although counts of minimum numbers of individuals indicate that ovicaprines were more numerous. *Ovis aries* remains were found in Pits 3,

Table 29. List of mammals from Ntsitsana

NTSITSANA FAUNAL REMAINS ACCORDING TO MNI/NISP.

	Pit1	Pit2	Pit3	Pit4	Pit5	Pit6	Pit7	Dk1	Dk2	Dk3	H1/T1
Lagomorpha											
Lepus capensis			2/3		1/1						
Hyracoidea											
Procavia capensis		5/8		2/3							
Carnivora											
Canis familiaris			4/38			2/30					
Canidae indet.			1/1			1/3			1/31		
Artiodactyla											
Suidae indet.			1/7								
Bos taurus		7/14	7/21	3/3	3/6	2/10				1/1	
Ovis aries	5/21		6/10	1/1		1/4	6/27				
Capra hircus						2/6	14/42				
Ovis/ Capra	7/12	13/37	18/51	1/2	2/4	4/11		1/1		2/2	1/1
Bovidae indet.											
small	1/2										
small-medium	4/6	8/21	6/27		1/1	3/5	3/5	2/6	1/1		
large-medium		2/2		2/3		1/1	9/35		1/1		
large		2/3	6/12						1/1		

5 and 6 and *Cappre hircus* was positively identified in Pit 6. Domestic dog (*Canis familiaris*), was represented in Pits 6 and 7.

The remains of wild animals were absent from features belonging to the earlier phase but there were small quantities in the larger samples available from the pits of the second phase. These included hare (*Lepus* sp.) in Pits 3 and 5, and rock hyrax (*Procavia* sp.) in Pit 4. Remains of an unidentified large/medium bovid was recovered from Pit 4. The assemblage is too small and the pelvis parts too fragmentary to establish a reliable picture of the sex ratios in the ovicaprid sample. However, the presence of sheep horn cores show that older males were kept for slaughter. While the reconstruction of age profiles was not possible in this sample it is evident that both young and adult animals are represented.

DISCUSSION

The observation that sheep were present at AD 660 is significant in that reports on sites in Transkei such as Oakleigh Shelter dated to 1760 BP (Derricourt 1977) and the Lujojozi early farming site dated to 1240 BP (Robey 1986), mention that possible small stock remains may have belonged to either sheep or goat. Although sheep were regularly observed amongst Khoi pastoralists in south eastern Africa during historical times they were rarely seen amongst black agropastoralists in the Transkei region (Derricourt 1977). Some authors have expressed the opinion that sheep were a late introduction to Transkei (Bigalke 1967; Shaw & Van Warmelo 1981) but the Ntsitsana evidence shows that sheep were not only important but probably the main domestic stock kept from earliest times. The cattle and goat remains in features dated to AD 770 at Ntsitsana are the earliest record of these animals in Transkei. At other early farming sites in this time range in southern Africa (Mason 1981; Voigt & Plug 1981; Huffman 1982; Mason et al. 1983; Voigt 1983, 1984a, 1984b; Voigt & Von den Driesch 1984) cattle appear to have become increasingly important although, as at Ntsitsana, small stock remains are more numerous. However, the numerical dominance of small stock on Early Iron Age sites may reflect cultural discard patterns rather than the actual proportions of livestock (Huffman 1991). The Ficus Site in the Southern Transvaal (Moore 1981) and sites situated in the Kruger National Park (Plug 1984a, 1987, 1989a, 1989b; Plug & Voigt 1985) are the exceptions and those assemblages include relatively more cattle remains.

A preponderance of sheep over goats in the identified ovicaprine material was observed in the faunal assemblages at Ndondondwane and Magogo in Natal (Voigt 1984a; Voigt & Von den Driesch 1984). The presence of numbers of young and adult ovicaprines in the Ntsitsana assemblage provides a contrast with the prominence of young animals from sites predating AD 900 in Natal and Transvaal (Maggs 1980c; Mason 1981; Voigt 1984a, 1984b; Voigt & Plug 1984; Voigt & Von den Driesch 1984). The disproportionate representation of young animals at these sites can be explained by the fact that small stock were an important source of meat and so there was an attempt to maximise the yield by slaughtering a high percentage of animals young (Von den Driesch & Deacon 1985). That a similar pattern was not found at Ntsitsana may reflect an inadequate sample size. Alternatively the Ntsitsana material may indicate a reduced importance of small stock in the economy of these farmers. It is significant that cattle remains occurred in all the excavated pits belonging to the second occupational phase of Ntsitsana. In that time range it is possible that small stock were of less importance relative to cattle in and consequently flocks of small stock were less intensively managed.

The definite evidence for the presence of domesticated dog at Ntsitsana during the second occupational phase is one of the earliest occurrences in southern Africa. Domestic dog is known from Magogo in Natal, a site dated to between AD 600 and AD 700 (Voigt 1984a).

The date of introduction for domestic pigs is problematical. It is usually assumed that pigs were introduced into southern Africa by white settlers. The Ntsitsana evidence for the presence of pig is thus potentially important. There is also a tentative identification of domesticated pig remains at Ndondondwane (AD 750) in Natal (Voigt & Von den Driesch 1984). Ethnographic accounts suggest that a small local breed of pigs occurred in Transkei (Makalima 1945; Shaw & Van Warmelo 1981) and it is entirely possible that pigs were part of the complement of domestic animals husbanded in southeastern Africa before the advent of the Europeans. More substantial evidence is needed.

The list of wild species is limited because samples are small and come mainly from pits. The faunal diversity is amongst the lowest recorded for any first millennium farming site in southern Africa. Hunting of game was apparently not a priority among early farmers in the Transkei and even ground game more easily got provided a small proportion of the diet. The overwhelming importance of domestic livestock in subsistence at Ntsitsana is consistent with the evidence from sites in Natal (Maggs & Michael 1976; Maggs 1980c; Voigt 1984a; Voigt & Von den Driesch 1984). The contrast is with some settlement sites in the Transvaal where hunting was a major activity (Moore 1981; Voigt & Plug 1981; Evers 1982; Plug 1984a; Plug & Voigt 1985; Plug 1989a). The explanation for parallels and contrasts may have less to do with the biomass available than whether the species of game are dangerous. Valley Bushveld has a high faunal biomass with elephant, rhinoceros and buffalo, making up a significant proportion of the fauna.

The Mpame Site (c. AD 700) on the south coast of Transkei includes a wider range of wild animals than Ntsitsana and no conclusive evidence for domestic animals occurred (Cronin 1982). This site is a shell midden and may represent a camp used intermittently for shell collecting and hunting trips. Alternatively, it could represent the stock post of client Khoi pastoralists. Either way, Mpame is not directly comparable to Ntsitsana.

INVERTEBRATES

Evidence for coastal contact at Ntsitsana lies in the presence of marine shell. Shell remains occurred in small quantities in two pits (Pits 2 & 3) which belonged to the second phase of occupation. These have been identified as representing between one and four individuals of *Patella concolor* and *Patella* spp., *Perna perna*, *Janthina exigua*, *Bursa* sp. and *Fissurela* sp. The range is relatively diverse when compared to other like-aged farming settlement sites (Maggs 1980a, 1984b; Maggs & Ward 1984; Plug & Voigt 1985). With the exception of *Janthoina exigua* and *Bursa* sp. these taxa continue to be used as a supplementary food resource by coastal tribesmen in Transkei at present (Bigalke 1973). As Ntsitsana is 75 km from the coast, too far for shellfish to have been a major resource (Cable 1984), the marine shell possibly reflects casual imports for purposes such as ritual and decoration. The fresh water mussel *Unio caffer*, a potential food source, is represented by only three individuals in the samples. *Unio caffer* communities may still be present in some reaches of the Mzimvubu River but as a filter feeder the species is susceptible to the high silt loads generated by erosion. One of the immediate impacts of the introduction of agriculture to the area would have been to increase runoff and decrease water quantity in the river with predictably negative effects on populations of *U. caffer*.

A small collection of 26 shell disc beads was recovered from the pits and the burnt dung area. Beads were associated with both occupational phases of Ntsitsana. The identification of the bead material was undertaken by V Ward of the Natal Museum. Twenty four of the beads are made of shell from landsnails of the genus *Achatina* but identification could not be made to species level. Two could be identified as *Metachatina krausii*. Additionally, two ostrich eggshell (OES) beads were found.

It has been argued that the raw materials used for shell disc beads may be an indicator of environment (Maggs 1980c; Maggs & Ward 1984). Identified bead materials from Ntsitsana include *Metachatina krausii* and ostrich egg shell and these represent species which are ecologically unrelated. Ostrich inhabit drier savanna or essentially treeless environments (Clancey 1964) whereas *Metachatina krausii* requires moister more densely wooded areas since they are quickly killed by direct sunshine (Van Bruggen 1978). There is no evidence in the published literature that *M. krausii* formerly occurred in Transkei. The southernmost modern record of this species is Kelso in Natal about 180 km northeast of Ntsitsana. If in fact it did formerly occur at Ntsitsana this may indicate higher temperatures in the recent past for this region (Van Bruggen 1978). Ostrich was observed by Baines in south western Transkei during AD 1848 (Feely 1989). The OES beads, representing only 7.6% of the total, were there fore probably introduced from drier more open country further westward. These are likely to have been widely traded items with no ecological significance.

SUMMARY & CONCLUSION

Ntsitsana provides the earliest definite record of sheep, goat and cattle in Transkei. Initially stock keeping was focused on sheep with the later introduction of goats and cattle. Dogs and pigs may have been kept. There are traces of the use of both marine and fresh water invertebrates. Hunting appears to have been of minor importance as the wild ungulate remains are few in the available samples. The composition of the fauna complements reconstructions of the habitat during the last two thousand years made on other grounds. The presence of goats in the later phase may be seen as a factor contributing to environmental degradation.

9 DISCUSSION

INTRODUCTION

The two periods AD 660–770 and 1800–1990 provided the palaeoenvironmental data considered in this study. These data give direct information on the impact of precolonial and historic farming activities on the natural vegetation in northern Transkei. However, no archaeological sites belonging to the intervening period, AD 800–1800 have been located along the Mzimvubu River. This observation reflects an apparent total or near total absence of precolonial farmers in the area for 1000 years. Several factors may have contributed to the absence of early farming communities but the most likely explanation is climatic conditions. The changing patterns of the distribution of archaeological sites at different periods is some of the best proxy evidence for climatic change in Transkei. The use of this kind of proxy evidence in palaeoclimatic reconstruction is based on the central assumption that climate would have had a direct influence on the productivity of natural and or anthropogenic ecosystems and as a result climatic factors would have constrained the distribution and density of people (*vide* Deacon & Lancaster 1988). However, a good understanding of the distribution of early farming settlements, not only in the study area but also in the whole of Transkei, and an appreciation of the processes of climatic change are necessary to avoid circular arguments. This chapter attempts to bring together various lines of information to assess the importance of palaeoenvironmental factors in the development of precolonial and colonial settlement along the Mzimvubu River. The archaeological data also give an insight into the social factors underlying the history of farming settlement in Transkei. Such knowledge is also necessary to understand the effects of changes in the natural environment as they affected a changing social order.

THE INFLUENCE OF CLIMATIC CHANGE ON EARLY FARMING SETTLEMENT IN TRANSKEI

It has been noted that Transkei is situated on the south-eastern boundary of the summer rainfall region of southern Africa (Fig. 8). The transition between this summer rainfall area and the all-seasons rainfall area, to the south west of Transkei, is fixed by the prevailing weather systems operating over the subcontinent (Tyson 1986). A change in one or more synoptic climate parameters causes displacement of this boundary. The prediction is that the 500 mm isohyet would have shifted westwards with an increased incidence of tropically-induced disturbances such as circulation patterns which enhance rainfall-producing conditions. The reverse situation would apply during periods of drought. As dryland agriculture by precolonial farmers would have been constrained by the effects of climatic change it can be inferred that the initial expansion of farming settlement in Transkei was directly linked to an elevated incidence of summer rainfall.

The pottery samples from surface sites collected by Feely (1987), samples collected in the present study and information available in the literature (Derricourt 1977; Robey 1985; Feely 1987; Robey & Feely 1987) have been used to map the changes over time in the distribution of farming sites in Transkei. The pattern can be compared to that described from Natal (Maggs & Michael 1976; Maggs 1980a, 1980b; 1984a; Maggs & Ward 1984).

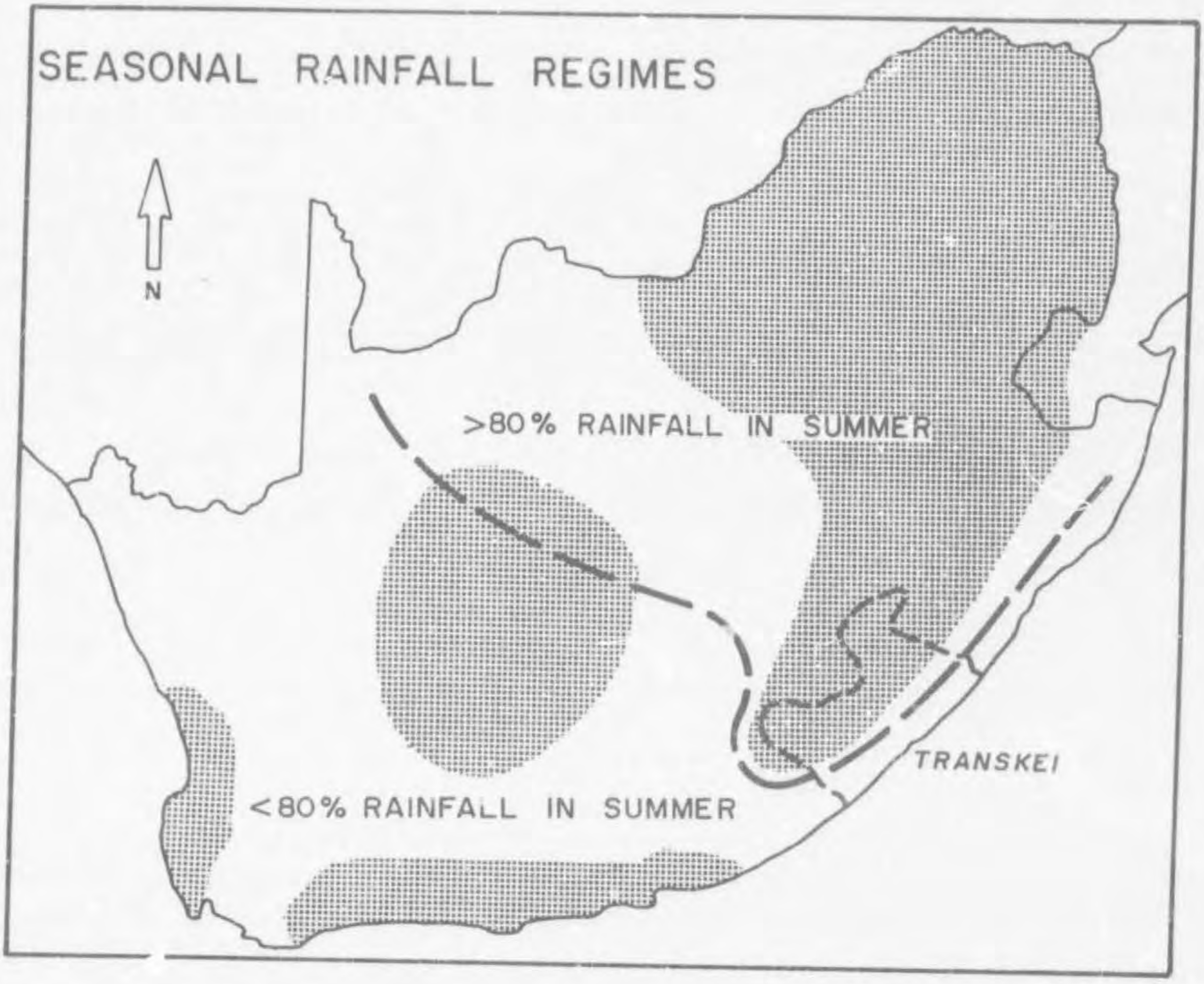


FIG. 8 SEASONAL RAINFALL REGIMES IN SOUTHERN AFRICA WITH THE CORE RAINFALL AREAS SHADED (after Tyson 1986)

Although no Matola sites have as yet been identified in the Transkei (Feely 1987) sites belonging to the subsequent Msuluzi phases are widely distributed and occur in a relative high density (Fig. 9). The results suggest that environmental conditions favouring settlement were optimal during the period AD 500–660 in Transkei. The most south–westerly recorded first millennium farming site in Africa is the Chalumna Shell Midden approximately 55 km to the southwest of Transkei (Maggs 1984b). This site contains pottery typologically similar to that associated with the initial expansion of farming settlement in Transkei. The geographical position of Chalumna corresponds almost exactly to the present limits of summer rainfall adequate for growing sorghum, cowpeas and millet, the main tropical cultigens of this period (Humphreys 1976; Maggs 1980a). The implication is that the summer rainfall regime at around AD 500–660 was broadly comparable with the present situation. Supporting evidence that equivalent climatic situations prevailed is provided by xylem analysis of charcoal which indicates similar figures for annual precipitation.

Archaeological sites belonging to subsequent farming settlement phases, extending to about AD 770 and recognised in Natal have been identified only in northern Transkei. None occur in central and southern Transkei (Fig. 9). There are five Ndondondwane pottery phase sites (c. AD 770) recorded in the northern region. The apparent absence of evidence for farming occupation of southern Transkei from about AD 700 indicates that from this period environments became less favourable for the maintenance of settlements. It appears that early farmer settlement decreased in the centuries after AD 700 so that by AD 900 only one possible Ntshekane site is recorded from northern Transkei (Robey 1986).

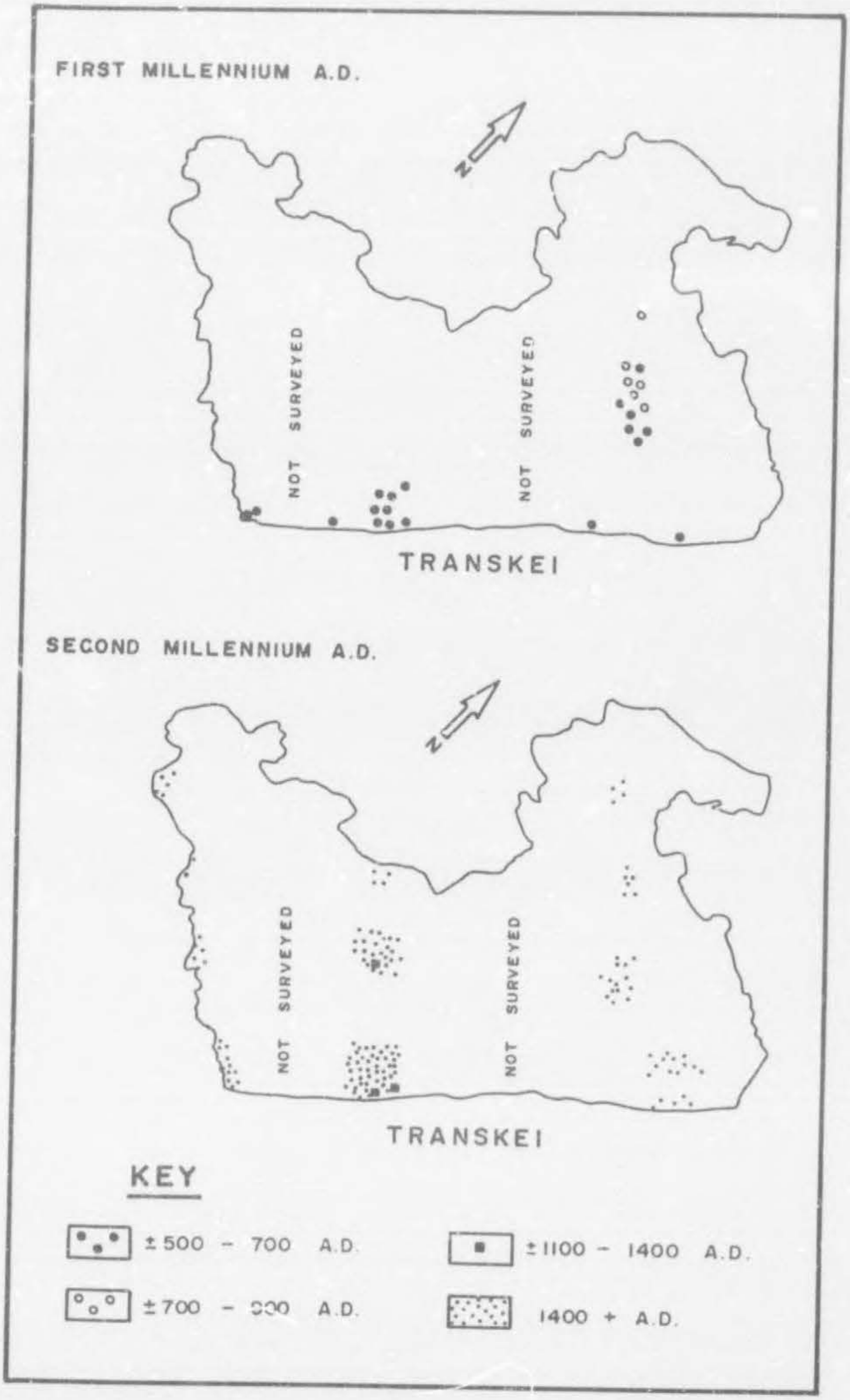


FIG. 9 DISTRIBUTION OF KNOWN FARMING SITES BELONGING TO DIFFERENT PERIODS IN TRANSKEI. EACH DOT/SYMBOL REPRESENTS ONE SITE (after Feely [1987] AND THIS STUDY)

In adjacent Natal similarly dated settlement also became more sparse (Maggs 1989) and there is a parallel decrease in observations for the period in the western Transvaal (Mason 1988). Although there is no evidence for precolonial farming occupation along the middle reaches of the Mzimvubu during the beginning of the second millennium, two twelfth century sites, one located in Ciskei, are known to occur south of this river (Table 30). Ceramics typologically referred to as the Blackburn group (Robey & Feely 1987) are associated with these sites and have been interpreted as the earliest evidence for Nguni speaking farmers in southeastern Africa (Huffman 1989a). The data do not rule out more continuous settlement at some localities that benefited from a situation close to the coast.

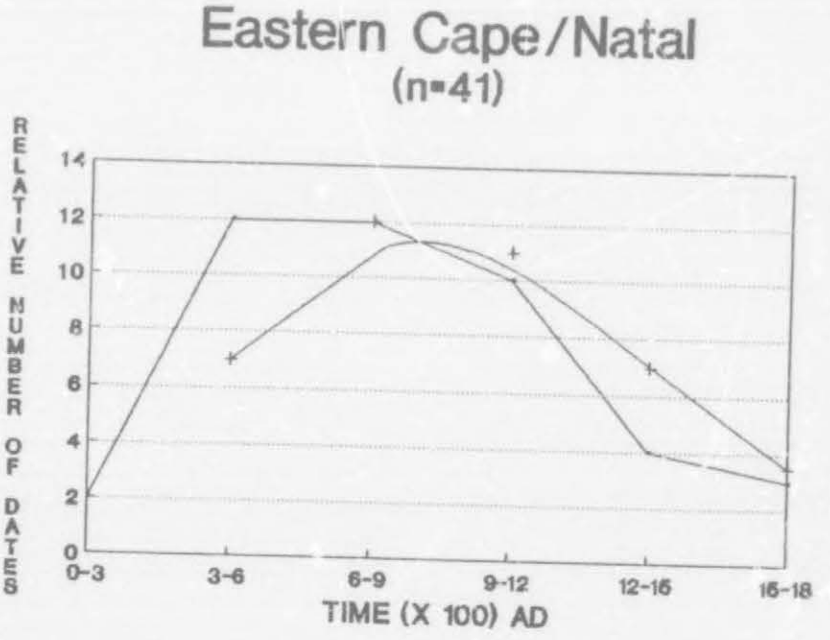
This period of sparse settlement (c. AD 900–1200) is broadly contemporaneous with globally warmer episodes recorded in both the northern and southern hemispheres (Lamb 1982). It has been argued that there is an inverse relationship between temperature and summer rainfall in southern Africa (Taljaard 1988). The charcoal data obtained in East Griqualand (Tusenius 1986) adjacent to Transkei, for example, suggest that there was such an inverse correlation during the Holocene as a whole. It is probable that similar relationships between high temperatures and decrease in summer rainfall and vice versa, prevailed during the period of farming settlement as well. Recent evidence suggests that the medieval warmer period was by no means a uniform climatic episode and various temperature fluctuations had occurred within it (Briffa et al. 1990). Nevertheless, oxygen isotope speleotherm measurements from the Cango Caves provide direct evidence of warmer conditions in southern Africa at about AD 1000 (Tyson 1986:56) whilst geomorphological data obtained in Namibia also argues for the presence of drier conditions at around this time (Vogel 1989:364). Southern Africa as a whole appears to have experienced what are effectively drought conditions during this period of global warming.

The prevalence of arid conditions in southern Africa is associated with the extreme climatic events, referred to as the El Nino, and these represent periods when the maximum reversal of the weather systems take place The catastrophic droughts of 1982/83, for instance, were directly related to an extreme El Nino event (Preston–Whyte & Tyson 1988). Modelling climates in southern Africa during an El Nino event is difficult and present knowledge about the effects of the last and the present events are all too apparent in the widespread poor harvests. El Nino events have a cyclicity of about 20 years and this may not have changed in the past but under globally warmer conditions the severity of the events would have been more extreme than in the present. Under such conditions there is an eastward displace ment of the 500 mm isohyet. With the weakening of tropical circulation after AD 660 the 500 mm isohyet may have been progressively displaced and been located in northern Transkei towards the end of the first millennium AD. The typical settlement focus of the first millennium farmers in large valleys below 1000 m.a.s l in Transkei would have been unsuitable for dryland agriculture on a large scale.

The low archaeological visibility in Natal and Transkei, at the beginning of the second millennium AD, contrasts with the situation north of the Tropic of Capricorn (Fig. 10). A number of areas north of the Soutpansberg were settled during this period. This suggests that areas under the influence of anticyclonic weather systems in southern Africa are out of phase with those under the influence of tropical or monsoon systems. It is known that the Holocene and the drier period of the early Holocene in southern Africa (c. 5–10 000 BP) (Deacon & Lancaster 1988) is out of phase with the wetter conditions that prevailed in the Sahel and eastern Africa (Perrott & Perrott 1990). The effects of climatic changes should be considered in addition to trade in explaining why the formation of states took place in northern Transvaal and Zimbabwe at a time when Transkei was sparsely populated by farming communities.

There is evidence in the occurrence of sites with Blackburn wares that some communities survived in Transkei in the first half of the second millennium AD as at Mpame dated around AD 1410 (Cronin 1982). In the following century Portuguese seafarers described Nguni farmers of the Transkei coast (Shaw & Van Warmelo 1972; Derricourt 1974). From this time (AD 1500–1870) there was a very marked expansion of farming settlement (Fig. 10) (Derricourt 1977; Feely 1987).

Dendrochronological studies, especially the tree ring series described by Hall (1976) for Karkloof in Natal, provide data for climatic change which are broadly contemporaneous with this second expansion of farming settlement. These results can be extrapolated to the Transkei region. The Karkloof study indicated that between the fourteenth and the mid fifteenth centuries, slightly earlier than the so-called "Little Ice Age" in Europe (Tyson 1986), conditions were locally cooler than the present. Unfortunately no sites of this period have been located or investigated for palaeoenvironmental evidence in Transkei region but the cooler conditions were probably accompanied by a higher summer rainfall (*vide* Taljaard 1988) and a more westward position of the 500 mm isohyet. The apparent improvement of climatic conditions may have been a factor in facilitating the spread of maize cultivation.



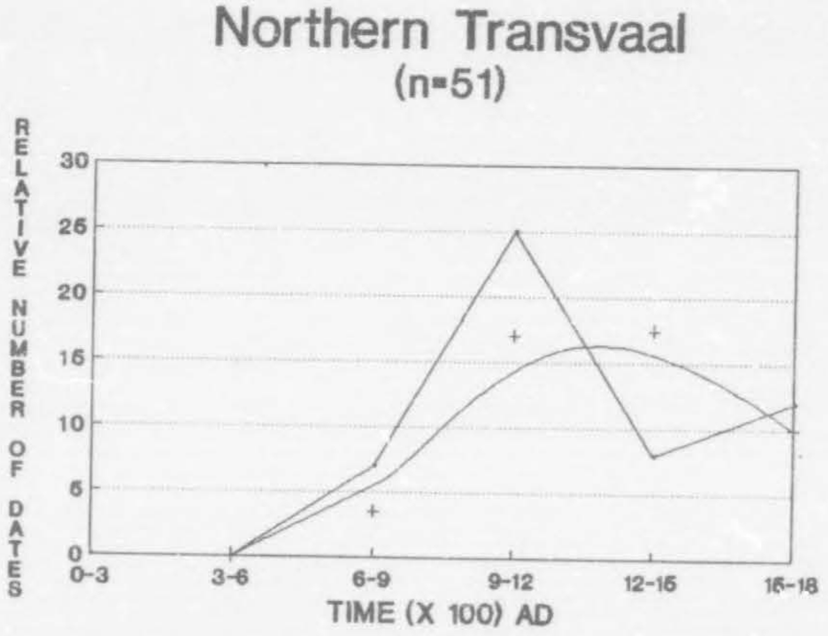


FIG. 10 FREQUENCY DISTRIBUTION OF RADIOCARBON DATES FROM PRECOLONIAL FARMER SITES IN EASTERN CAPE/NATAL AND NORTHERN TRANSVAAL RESPECTIVELY. TREND INDICATED BY TWO ITEM MOVING AVERAGE METHOD (NEISWANGER 1943)

This change in main crop cultivation allowed settlement of sites other than valley bottom alluvial soils (Huffman 1986). Oral history suggests that some high altitude grassland areas in Transkei may have been settled as early as the seventeenth century (Soga 1905; Ndima 1988) and prior to the introduction of maize. The evidence needs to be corroborated in archaeological observations. The Karkloof tree specimen indicated that the eighteenth and nineteenth centuries were marked by alternatively wet and dry periods. This pattern of fluctuations in which a 18 year peak is evident is still discernible in the modern climate records from the northern Transkei (Tyson 1986).

THE IMPACT OF FARMERS ON THE ENVIRONMENT

Although the forcing effects of climate changes had a profound effect on the demography of early settlement, ecological changes was caused by human activities in Transkei environment. Prior to farming settlement the main human impact would have been the seasonal burning of the grassveld by San hunter-gatherers and Khoi pastoralists (Feely 1987). The effects of Khoi stock-keeping on the ecology of parts of Transkei is difficult to evaluate because so little is known of the history of Khoi settlement in the area.

Without doubt the greatest anthropogenic impact on the Transkeian environment was initiated with the arrival of early farming populations in the sixth century AD (Robey & Feely 1987), or earlier. The primary palaeoenvironmental information was obtained at Ntsitsana (c. AD 660–770) along the middle reaches of the Mzimvubu River, and the results can be extrapolated to the larger Transkei area. These farmers were likely to have pursued a slash and burn cultivation on the fertile soils of the alluvial terraces of the valley bottom (*vide* Hall 1981). Fields would only remain productive for a few years and thereafter new fields would have been cleared. The flanks of the valleys and inter fluves would have been used for the grazing of livestock.

In the faunal remains for the earliest period of occupation at Ntsitsana (c. AD 660) only sheep have been positively identified and the presence of sheep provides evidence for the existence of a vegetation type transitional between pure grassveld and thicket such as Southern Tall Grassveld. Diseases (Jacobson 1970) and grass height (Bransby 1980) confine modern sheep farming to this veld type in Transkei. Grunow (1980) has indicated that sheep show a decided preference for burnt areas. In Valley Bushveld, however, fires are infrequent as there is usually insufficient grass understorey to provide fuel (Teague et al. 1981; Trollope 1982). The presence of sheep thus argues for the occurrence of Southern Tall Grassveld type on the higher lying valley areas and possibly extending onto the interfluves of the valley. Phytoliths identified in burnt dung deposits shows that the early sheep grazed on C4 grasses as occur in present day Southern Tall Grassveld. Thus although the area of primary settlement was along the river the impact on the environment would have included the grasslands of the upper valley margins and possibly the interfluves.

At Ntsitsana pottery of the Msuluzi and Ndondondwane phases occurs in the pits and in the stock kraal areas (Fig. 2). This implies occupation of the site over a hundred year period from AD 660–770. Occupation of Ntsitsana for a century or more, even if not continuous, would have had a major impact on the local woody vegetation. The clearing of woodland on the alluvial soils of the valley bottom to build huts, kraals, to create fields, and the collection of firewood, would have been the initial impact on the vegetation.

The low frequency of forest species identified in the charcoal generated by these farmers suggests that they had little impact on the relict forest patches. The largest range of taxa identified are species found in present day Valley Bushveld. Dense Valley Bushveld vegetation was probably replaced by a more open vegetation mosaic after a hundred years of continuous farming (c. AD 770). The appearance of cattle close to AD 770 and the concurrent decrease in the abundance of woody species suggests that the sweetveld understorey became more extensive in the cleared areas of the Valley Bushveld. The grass *Urochloa panicoides*, a widespread weed and pioneer of disturbed areas (Chippendal & Cook 1976) and identified in the seed remains at Ntsitsana, can be taken as a definite indication of environmental degradation during this hundred year period. It may have become established on ground cleared for cultivation. As seeds of this grass were found in pits it may have been relatively abundant around the area of the greatest environmental impact which would have been the settlement.

Present evidence suggests that farming of the middle reaches of the Mzimvubu Valley ceased for almost a thousand years after AD 770. The area was reoccupied approximately AD 1800 by Nguni groups. The vegetation had ample time to recover in the intervening period. It is from the near pristine conditions of some two hundred years ago that the impact on the environment of continuous occupation by farmers must be judged.

The occurrence of limited areas of kraal dung together with historical accounts (Scully 1909; Theal 1909) shows that the middle reaches of the Mzimvubu were suitable for cattle herding at the time of reoccupation (c. AD 1800). This may imply that mixed grasslands still occurred on the interfluves. Charcoal analysis suggests that the valley was well wooded as the species diversity in the relevant samples is high.

The continuous occupation of the same areas for more than a hundred years coupled with the increase in the population of Transkei in modern times has led to marked environmental deterioration (McKenzie 1984b). Since the 1800's the charcoal samples record a sharp decrease in species diversity. After 1950 the inhabitants of the valley collected green wood to offset the increasing shortage of dry firewood. Subtropical pioneers like *Acacia karroo* have increased in abundance on the interfluves as well as the cleared areas of alluvial soils in the valley bottom (Granger pers. comm.) and in the valley they compete with less hardy taxa of the climax vegetation. The present-day abundance of *Acacia* spp. may be directly linked to a recent increase in the numbers of goats over cattle (Hawkins & Associates 1980). Over grazing by cattle and sheep has led to the removal of topsoil and extensive sheet and gully erosion has been initiated where the vegetation cover has been impaired. The duplex soils underlying Southern Tall Grassveld on the interfluves are erodable and where erosion caused by overgrazing and misuse of fire has taken place, woody components such as *Acacia karroo*, have become established (McKenzie 1984a). As a consequence the reduced grass cover has led to a decline in the carrying capacity for large stock (Bembridge 1984). The picture that emerges is one of progressive overexploitation and overgrazing. A degraded and eroded land scape with considerably reduced potential to support farming communities, has been produced over several centuries. The acceleration of this change should be viewed with concern.

SOCIAL INFERENCES CONCERNING EARLY FARMING SETTLEMENT

This study was conducted within an ecological research project and the aim was therefore not to write a detailed account of early farming. However, the study has provided some new archaeological information on the social communities involved in farming in Transkei. Until the 1960's scholars had to rely on oral traditions and ethnohistories – Soga's (1930) " The South-Eastern Bantu" was the chief source. This book is a scholary but now somewhat dated account of the history of the southern Nguni in Transkei. Within the southern Nguni five tribal clusters have been identified. These are the Xhosa, Thembu, Mpondo, Mpondo mise, and Bomvana (Derricourt 1974). Each of these clusters had its own history, customs and a strong sense of identity and they were divided into a number of independent chiefdoms (Hammond-Tooke 1975:9). In his discussion of the origins of the different southern Nguni groups Soga relied on Mpondomise informants. Their oral traditions associate the Dedesi Stream in the upper reaches of the Mzimvubu River near the foothills of the Drakensberg, with the original heartland of not only the Mpondomise but also the Xhosa and Thembu. Thus far, archaeological surveys have failed to find evidence of any settlement of this area, other than that of hunter-gatherers, prior to the nineteenth century (Derricourt 1977; Feely 1987). The southern vanguard of the southern Nguni were the first African farmers to come into sustained contact with the expanding white frontier in southern Africa.

However, the earliest substantial evidence for the presence of African farmers in Transkei and environs has not come from historical records but from isolated archaeological observations. Apart from the evidence provided by Ntsitsana, investigated in this study, radiocarbon dates ranging from the seventh to the ninth centuries have also been obtained at Mpame and Lujojozi (Table 30). The archaeological reconnaissance of the major river basins of Transkei carried out by Feely (1987) has provided evidence for an additional 20 early farming sites of this period. The pottery samples of all these sites belong to the so-called Lydenburg Tradition (Hall 1987a), Lydenburg Cluster (Evers 1989) or the Kalunda Tradition (Huffman 1989b) thus typologically connecting it to contemporary sites as far afield as Zaire (ibid).

In Transkei it appears that settlements of this early age have their highest density along the middle reaches of the Mzimvubu River Valley. There appear to be fewer in the south-west (Feely 1987:68) but the distribution may prove patchy rather than continuous. The concentration of similarly aged settlement along [illegible]bu shows that there was a viable community that can be studied as an entity.

The remains of livestock kraals, observed on three sites, indicate the approximate positions of the court areas in these settlements. Clay figurines obtained at some sites may point to organised initiation schools. Interactions in both the economic and political spheres is indicated because while there is little iron slag at Ntsitsana it is abundant on a nearby site indicating some specialization in function (Appendix 2). Such observations may point to a relatively "advanced" political system, such as a chiefdom (vide Evers & Hammond-Tooke 1986).

Table 30. Radiocarbon dates from the Transkei and Ciskei which relate to prehistoric farming and/or herding

Site	Radiocarbon date			Reference
Chaluma mouth	Pta-718	935±55 BP	(AD 1015)	(Derricourt 1977)
[illegible]lledrift	Pta-836	920±50 BP	(AD 1030)	(Derricourt 1977)
Oakleigh farm	Pta-735	1040±50 BP	(AD 910)	(Derricourt 1977)
Oakleigh farm	Pta-801	360±50 BP	(AD 1590)	(Derricourt 1977)
Fort Hare	Pta-3101	880±50 BP	(AD 1100)	(Banghart 1982)
Mpame	Pta-2017	540±55 BP	(AD 1410)	(Cronin 1982)
Mpame	Pta-2045	1230±40 BP	(AD 720)	(Cronin 1982)
Mpame	Pta-2019	1310±60 BP	(AD 640)	(Cronin 1982)
Shixini	Beta-11111	200±70 BP	(AD 1750)	(Robey & Feely 1987)
Shixini	Beta-11112	2020±60 BP	(AD 330)	(Robey & Feely 1987)
Lujojozi	Beta-11113	1240±70 BP	(AD 710)	(Robey & Feely 1987)
Lujojozi	Beta-11114	1480±100 BP	(AD 470)	(Robey & Feely 1987)
Nkanya	Beta-11554	1200±60 BP	(AD 1150)	(Robey & Feely 1987)
Ntsitsana	Pta-4684	1290±50 BP	(AD 660)	this study
Ntsitsana	Pta-4687	1180±50 BP	(AD 770)	this study
Ntsitsana	Pta-4695	1180±50 BP	(AD 770)	this study
Ngosi	Pta-4688	160±50 BP	(AD 1650 - 1830)	this study

The extensive cattle dung deposits at Ntsitsana encourage speculation that this site may have been the abode of a chief (Huffman pers. comm.).

The exposed features on two sites, Ntsitsana and Ncabela, show that the organisation of space at these settlements is similar and differs from the southern Nguni pattern of later times. Rather than being centrally situated the kraal area is located directly adjacent to the Mzimvubu River on the edge of the settlement (Figs 2 & 11). Clusters of filled-in grain pits are situated at a distance from and are not directly related to the stock byre. The location of pits outside the kraal area contrasts with the traditional Nguni pattern where grain pits are situated within the livestock enclosure (Shaw & Van Warmelo 1974).

The exclusion of wives from the cattle byre and other areas associated with the "male domain" is a feature of modern Nguni society. Nguni women have restricted access to grain pits located in the cattle byres (Raum 1973; Davison 1988) and this allows male control over female production. The Nguni wife is treated as a rank outsider of the group (*vide* Preston-Whyte 1974) because of the rules of exogamy followed. In contrast, pit location in the first millennium AD suggest that the same degree of male control was not exercised over the food store. The explanation may be linked to kinship and wives may have been of the same group rather than outsiders. That pit locations at these early farming sites may be used to draw inferences on marriage rules is one of the more interesting insights to follow from this investigation. The settlement organisation recorded at these Mzimvubu sites needs confirmation in other areas. More extensive excavations within the livestock enclosures than carried out in this study are also required. The prediction is that no grain pits will be found in the byres if the interpretation offered is valid. It would seem that the pits were not associated with individual households but represented a communally owned food store.

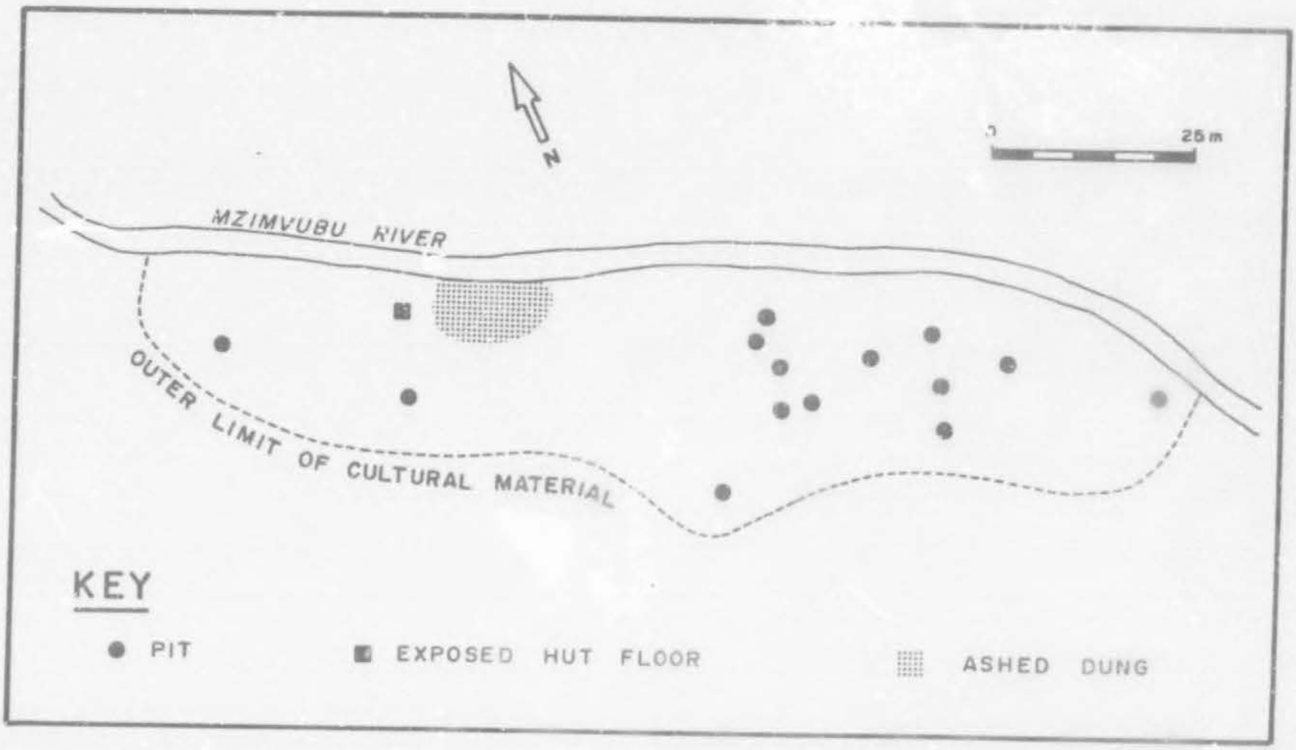


FIG. 11 PLAN OF NCABELA SHOWING EXPOSED SETTLEMENT FEATURES

It has been noted that most of these first millennium farming sites, in southern Africa, are situated in valley bottom areas in association with woody vegetation and this must reflect their similar economic needs (Hall 1987a). This, together with the span of similarly decorated ceramics, belonging to the period AD 500-900 from Eastern Transvaal to the south-west of Transkei, suggests some resistance to social and economic change. In fact conservatism may have been the single most important factor for the northern retreat of the farming frontier along with the limits of adequate summer rainfall towards the end of the first millennium AD. The areas to the west of the 500 mm isohyet would have received too little summer rainfall to make dryland agriculture a viable proposition. The early farmers would have been left with the choice to migrate eastwards and maintain their original economy or to remain in Transkei where they had to abandon dryland agriculture. Supporting evidence that the former idea was favoured has independently been provided by ceramic analyses to the north of Transkei. These suggest some continuity in ceramic typology between those of the Lydenburg Cluster of sites, thus including farming settlement in the Transkei, and the early second millennium sites of K2 and Leopards Kopje in the northern Transvaal (Huffman 1978). The northward migration of early farmers on such a scale may never have happened had they adopted and adapted to the economy of the Khoisan peoples with whom they were in contact on their western borders. The Khoisan were nomadic, and their hunting and gathering or pastoralist economy necessitated their moving over large tracts of country. The early farmers, in contrast, were settled people, and in addition to herding of livestock they also cultivated fields. Thus when prolonged aridity caused the farmers to leave their settlements these abandoned areas were probably resettled by the Khoisan.

The southern Nguni were probably more compatible with Khoi pastoralists in their social and political organisation than the first millennium farmers. Although the southern Nguni and Khoi differed from each other in many respects they were similarly organised in terms of family, lineage, clanship and loose independent chiefdoms (Harinck 1978). Intensive contact and interaction between the southern Nguni and the Khoi was facilitated by the fissiparous tendency in southern Nguni social structure (Hammond-Tooke 1965). Both groups placed a high value on the herding of livestock which was expressed in an elaborate cattle cult associated with the veneration of ancestors and in rarer instances with the supreme being (Hodgson 1982). This emphasis on pastoralism allowed some southern Nguni groups to settle in areas previously only occupied by the Khoisan (Peires 1981; Kallaway 1982). These areas were less suitable for the cultivation of crops. Some southern Nguni groups like the Xhosa, who lived on the farming frontier were probably undergoing a transition from a mixed farming to a pastoralist economy and this may explain how they were able to settle areas with a low incidence of summer rainfall.

These frontier areas, south-west of Transkei, have not been investigated on any large scale. Such investigation is merited. It would not only further our understanding of some of the topics considered in this thesis but would provide archaeological information to compliment the large body of historical information to compliment the large body of historical, linguistic, and genetic data (Harinck 1978; Ross 1980; Peires 1981; Nurse et al. 1985) on Khoi-Nguni interaction. This study has not been able to furnish information on contact between the Khoi, San and first millennium farmers and that too remains an unwritten chapter in the history of south-eastern Africa.

SUMMARY

Transkei was a frontier of early farming settlement. The earlier phase of settlement, restricted to valley bottom locations, took place under climatic conditions similar to the present. The area and density of settlement seems to have been much reduced in the succeeding 1000 years apparently due to unfavourable environmental conditions for crop raising. Correspondence with a global warm period is suggested. The climatic constraint on agriculture was reduced with an amelioration of clim[illegible] this together with the introduction of maize contributed to the large increase in settlements in the second millennium. Significant vegetation changes have occurred as a result of settlement notably in the last few hundred years. The trend has been for the areas of Valley Bushveld thicket to become less dense with the establishment of areas of secondary sweetveld. It was these areas that were occupied and farmed particularly by stock raising. The continuous occupation of the Mzimvubu Valley since about AD 1800 has caused progressive degradation of the environment. This study shows that the rate of environmental degradation has increased greatly in recent times and solutions to current problems will need to be found. The study has provided some insights into the organisation of settlements of the earliest farmers of Transkei and how that differed from later settlements. The differences are not confined to ceramic styles which are well known but are apparent in the formal lay-out of the homestead thus reflecting different marriage rules. The socio-economic compatibility of the later Nguni settlers with their Khoi neighbours is a further point of interest and may have been important in the expansion of the farming frontier to its western limits since the nineteenth century.

10 CONCLUSION

Environmental change during the last two thousand years has been caused by global scale climatic fluctuations (Lamb 1982). Large parts of Transkei became sparsely inhabited if not totally depopulated by precolonial farmers after an initial expansion of settlement around AD 600. The depopulation of Transkei at the beginning of the second millennium, can be correlated with warmer conditions and a reduced incidence of summer rainfall. Conversely the return of more reliable summer rainfall figures after AD 1400 allowed a second expansion of farming settlement into areas hitherto unoccupied.

Early farming activities were certainly also responsible for ecological change as can be seen by the progressive environmental degradation noted in Transkei over a 1 400 year period. That the impact of farmers on the Transkeian landscape was not as dramatic as suggested by Acocks (1953), and other plant scientists, is evident in the fact that the modern vegetation mosaic remained relatively unchanged. Nevertheless, clearance of the woody vegetation by sedentary farmers together with the pressure exerted on plant communities by their livestock, particularly in the last two centuries, has altered the distribution and the composition of the vegetation communities. Such environmental change is indicated by the changes in frequencies of woody taxa in the archaeological samples, changes in species diversity, and the appearance of invasive taxa. This study make some contribution to the high resolution palaeoenvironmental evidence for the last two millennia in southern Africa.

This study also provides useful information on the precolonial history of early farming settlement in Transkei. Since the inception of serious academic research into Transkei pleas have been made, by both anthropologists and historians (Wilson 1974; Hammond-Tooke 1969; Peires 1981), for information on African farmers in precolonial times. Such information, based on archaeological surveys and limited excavation, has accumulated slowly. There is good evidence, from ceramics and settlement location studies to show that first millennium farming settlement in Transkei was an extension of that in Natal. Nevertheless there are local variations in ceramic style and the organisation of space on settlements that need to be researched. The archaeology of the farming communities of the last two thousand years is poorly researched and could be the focus of a large scale investigation. The farming history did not begin in Transkei with the observation of the Portuguese seafarers but almost 1000 years earlier. Knowledge of this history needs to be taken up in our history books because the impression that occupation of Transkei by African farmers was a relatively recent phenomena is still entrenched. Much more archaeological research into all aspects of the history of Transkei, like the early farmers and their ecology, and the contrasts between farmers, herders and hunter-gatherers, is needed to come to an understanding how historical factors contributed to the shaping of the modern African societies of the region.

APPENDIX 1

CERAMIC ANALYSIS

INTRODUCTION

Seriation is an established approach in archaeology and is used to order sets of artefacts in a temporal sequence. It uses the principle that styles in the manufacture and decoration of artefacts change in popularity over time. A spatial dimension is involved as well because styles do not have universal distributions. In this study a typological analysis of the ceramics was undertaken to establish the sequence of distinctive styles represented in the assemblages collected from Transkei and for correlation with the better dated and well documented sequence of early farming settlement from Natal. The three radiocarbon dates from the Ntsitsana area have served as a check on correlations made.

THE NTSITSANA/MSULUZI CERAMIC PHASE

Ceramics excavated from Pits 1 and 7 at Ntsitsana, and surface collections made from two eroded and completely exposed pits (8 and 9) belonged to this phase. This material resembles the Natal Msuluzi Confluence assemblage (Maggs 1980c) in typology and is of the same age. The Transkei sample shows stylistic differences that merit the designation – the Ntsitsana/Msuluzi phase. The description of the pottery follows the system used in Natal (Maggs 1980a, 1980b, 1984a; Maggs & Michael 1976; Maggs & Ward 1984). As at the Msuluzi Confluence site (Maggs 1980c), there is a high degree of internal typological consistency. This is the case here too even though some of the vessels included in this description are from surface features.

There were 52 vessels that were sufficiently complete for inclusion in this analysis. Although the sample may not cover the full range of attribute combinations, it is adequate to describe the main characteristics of shape and decoration of the vessels (Table 31).

Table 31. Characteristics of the Ntsitsana/Msuluzi pots

Shape

2a)	Pot with curved everted neck (Fig. 13)
8a)	Lip profile, rounded (Fig. 12a)
9a)	Lip profile, flattened (Fig. 12b)
5a)	Neck-body junction (Fig. 13)
5b)	Lip profile, tapered (Fig. 12c)
13a)	External lip emphasis (Fig. 12f)

Position of decoration

8b)	Whole neck (Fig. 13)
9b)	Upper neck (Fig. 16)
32b)	Lower neck (Fig. 14)
10c)	Body-neck junction
12b)	Decoration on body (Fig. 13)

Decoration motifs

25b)	Band of oblique hatching (Fig. 22a)
17b)	Band of horizontal and oblique or vertical cross-hatching (Fig. 22b)
16b)	Two or more bands of oblique hatching
21a)	Band of opposed hatching without intervening grooves (Fig. 23c)
22a)	Band of opposed hatching with intervening grooves of horizontal and oblique or vertical cross-hatching (Fig. 22b)
24a)	Cord effect (Fig. 20a)
25a)	Band of even cross-hatching (Fig. 25b)
26a)	Band of uneven cross-hatching (Fig. 25c)
26c)	Oblique quadrilaterals-hatched (Maggs 1980c)
27a)	Short horizontal row or rows of impressions (Fig. 24d)
28ab)	Band of interlocking triangles a) hatched (Fig. 24a) b) alternately hatched (Fig. 24b)
29a)	Band of interlocking parallelograms/hatched (Fig. 24e)
30a)	Pendant triangles (Fig. 24c)
30c)	Miscellaneous decoration (Maggs 1980c)
35a)	Interruption by vertical grooves (Fig. 21a)
36a)	Interruption by oblique grooves (Fig. 21b)
39S)	Horizontal grooves on either side of band (Fig. 21c)
47S)	Bands of several horizontal grooves (Fig. 21d)

48S) Bands of vertical grooves (Fig. 21e)
49S) Band of horizontal grooves where some of the ridges (between the grooves) approximate triangular forms along the horizontal plane (greater than 120°) (Fig. 21f)
50S) Even cross-hatching with emphasis on oblique hatching in one direction (Fig. 25b)
52S) Band of obliquely hatched parallelograms
53S) Band of seemingly crude or incomplete parallelograms
54S) Band of several horizontal grooves where one ridge (top/bottom) contains a continuous triangular pattern (Fig. 22c)
55S) Band of several horizontal grooves where the grooves are approximately 10-15 mm apart
59S) Single horizontal groove (Maggs does not include this attribute as decoration, but it is used here in order to distinguish between intervening grooves and the grooves which are found on either side of a decorated band)
61S) Same as 23b) but emphasis is on oblique hatching (Fig. 24e)

Table 32. Ntsitsana/Msuluzi pots, matrix of attributes. The column and row numbers refer to the list of characteristics. The number at the end of each row is the total for each characteristic

	2a	5a	5b	8a	8b	9a	9b	12b	13a	16b	17b	21a	22a	24a	25a	26a	27a
2a		36	3	5	24	26	4	1	3	2	13	1	1	7	2	16	9
5a	1		2	1	22	15	3		3	2	10	1	1	4	2	14	[illegible]
5b					1	1				1	2			1			1
8a	2	2			2	1			1		1		1			1	1
8b								1		1	8	1	1	8	2	8	7
9a	2	7			17		4	1	3		11		1	4	1	9	6
9b											2					1	
12b											1			2			
13a	1	1					2				2						
16b													1				
17b														4			6
21a									1					1	1		
22a																	
32b											1						
49s															1	1	2
59s									1	1							1
61s																	

	28ab	30a	30c	32b	36a	39s	47s	49s	50s	52s	53s	54s	55s	59s	61s	
2a	1	1	1	1	1	1	3	3	1	1	1	1	2	4	1	176
5a	1			1	1	1	3	3	1	1	1		1	2	1	107
5b				1										1		9
8a					1									2		15
8b	1	1			1		3	3	1	1			2	2	1	53
9a		1			1		3		1				2	1	1	79
9b																[illegible]
12b		1														4
13a																6
16b																1
17b		1										2				13
21a																3
22a					1											1
32b																1
49s																4
59s									1							4
61s									1							2

Like the Msuluzi type pottery from Natal there is little variation in pot shape (Table 32), all vessels fall in the category of "curved everted necks". The point of inflection between neck and body is not defined by a significant change in angle but it often coincides with the bottom of the banded neck decoration. Bodies are spherical to subspherical in shape.

Lip profiles are characterised by a high percentage (72%) of flattened lips, while few of the lips are rounded (12.5%). Some profiles have both flattened and rounded areas, an attribute observed in the Mpondo and Bakwena pots still made in the Transkei. Ethnography suggests that a distinction between flattened and rounded lips may not be particularly meaningful in this context. A small percentage of lips are tapered (6%), an at tribute not listed for the Natal Msuluzi ceramics. The Ntsitsana/Msuluzi lip profiles also differ in that rounded profiles are not more common than the flattened lips. Rare examples containing a groove or row of notches on the lip have been recorded in Natal (Maggs 1980c), but these have not been recorded in the Ntsitsana/Msuluzi assemblage.

Most of the Ntsitsana/Msuluzi pots are decorated but five (11%) of the 45 are plain. Decoration consists of one or more horizontal bands occupying the whole neck (71%) (Fig. 13) the upper neck (10%) (Fig. 16) or in rare examples the lower neck (19%) (Fig. 14). Decoration is by relatively bold V or U shaped grooving in the form of horizontal lines, oblique hatching, cross-hatching and short horizontal row or rows of uneven cross-hatching. Most vessels have one or two bands (Figs 13, 14 & 16). Some have three bands but none have more, in contrast to the Natal Msuluzi sample (Maggs 1980c). The sample is too small to give a clear indication of preferred combinations of motifs. As in the case of the Natal Msuluzi pots, body decoration takes the form of pendant triangles from the body/neck junction (Fig. 13). This is the only form of body decoration recorded from Ntsitsana although the Natal sample contains a larger range of body decoration motifs. With the exception of uneven cross hatching, the most common band motifs differ in the two areas. However, the same general range of motifs appear in both assemblages but in different proportions. In addition there are a number of motifs that are unique to each assemblage. These are; Natal-Msuluzi motifs no. 19, 20, 40, 29 (Maggs 1980c:123), and Ntsitsana/Msuluzi motifs no. 39S, 47S, 48S, 49S, 50S, 53S, 54S, 55S, 59S & 61S.

Bowls are described separately from pots as they have few attributes in common. Only six bowls are sufficiently complete for analysis. Bowls are less common than pots. In contrast to the Natal assemblage none of Transkei bowls are decorated, and only two simple shapes occur (Table 33).

Table 33. Characteristics of the Ntsitsana/Msuluzi bowls

Shape	
7a	Incurved bowl (*vide* Lawton 1967)
44S	Deep straight sided bowl with rather thick walls, slightly inward sloping (Fig. 19)
8a	Lip profile rounded (Fig. 12a)
9a	Lip profile flattened (Fig. 12b)
13a	External lip emphasis (Fig. 12f)

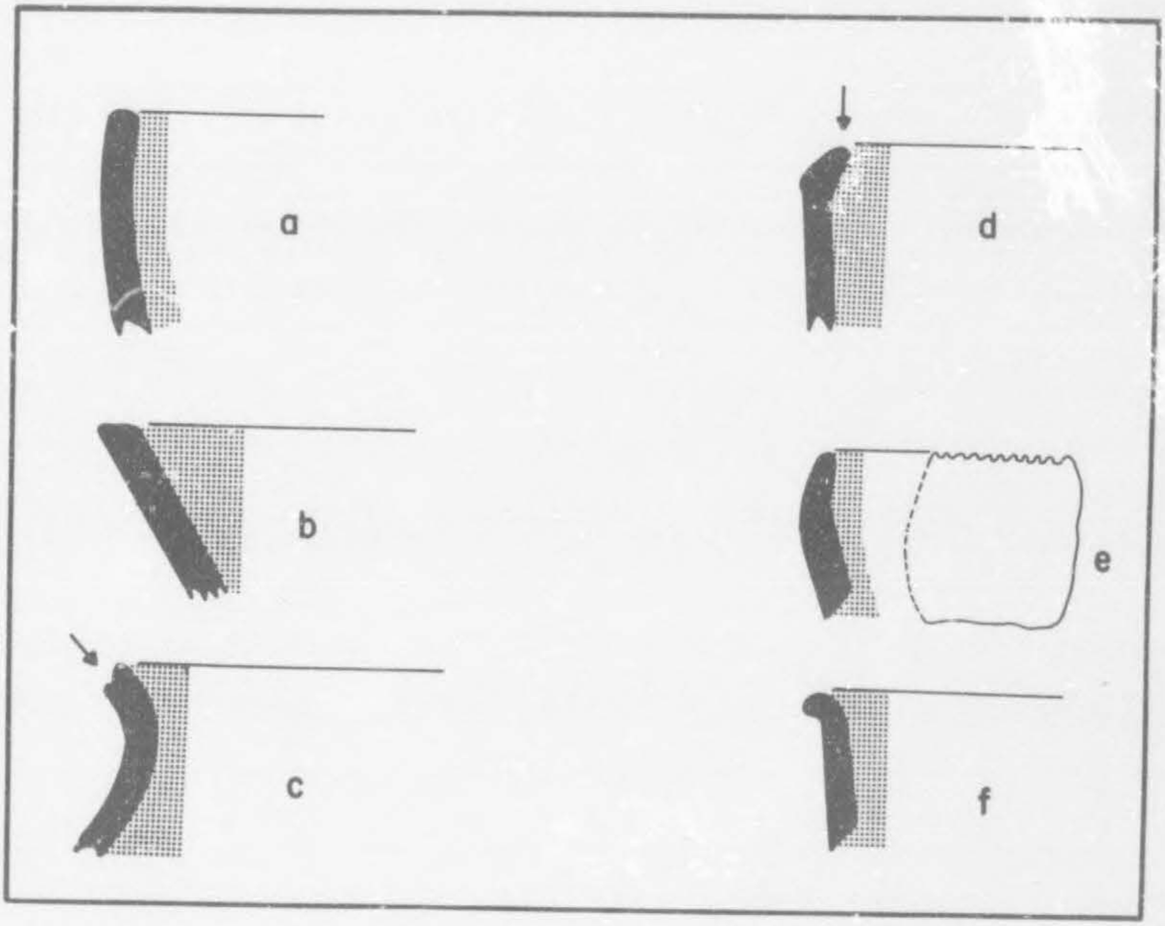


FIG. 12 THE TERMINATION OF THE LIP PROFILE

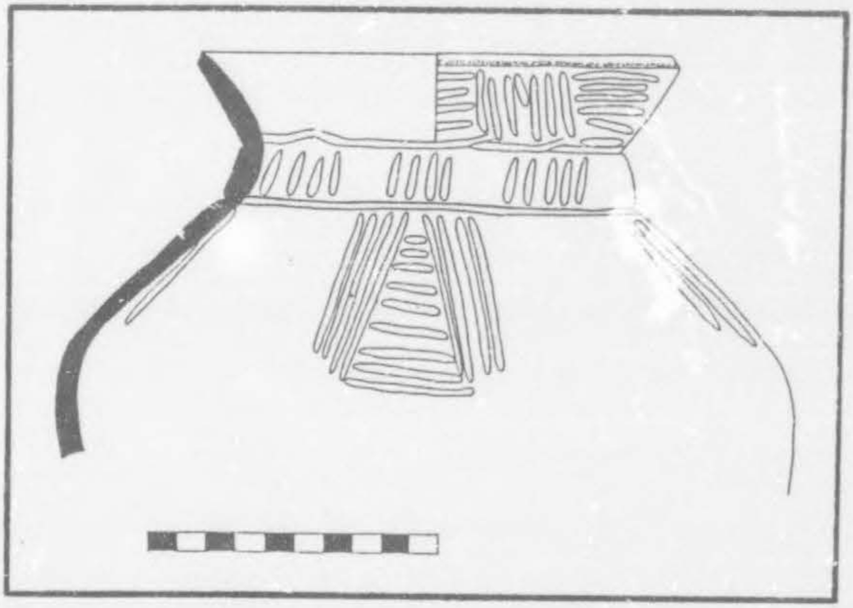


FIG. 13 TYPICAL MSULUZI/NTSITSANA POT, FROM PIT 1

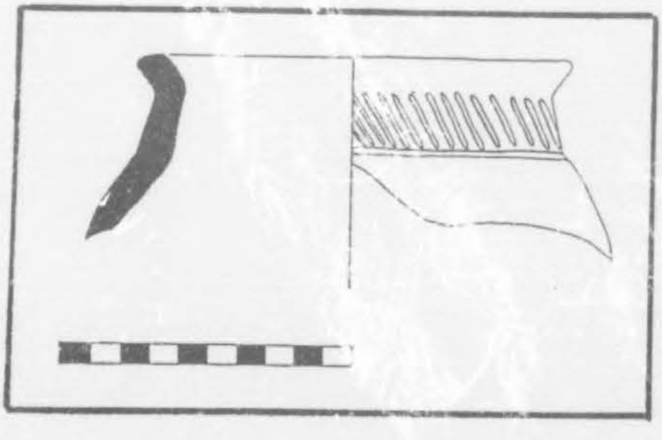


FIG. 14 POT RECOVERED FROM PIT 9 (NTSITSANA/MSULUZI)

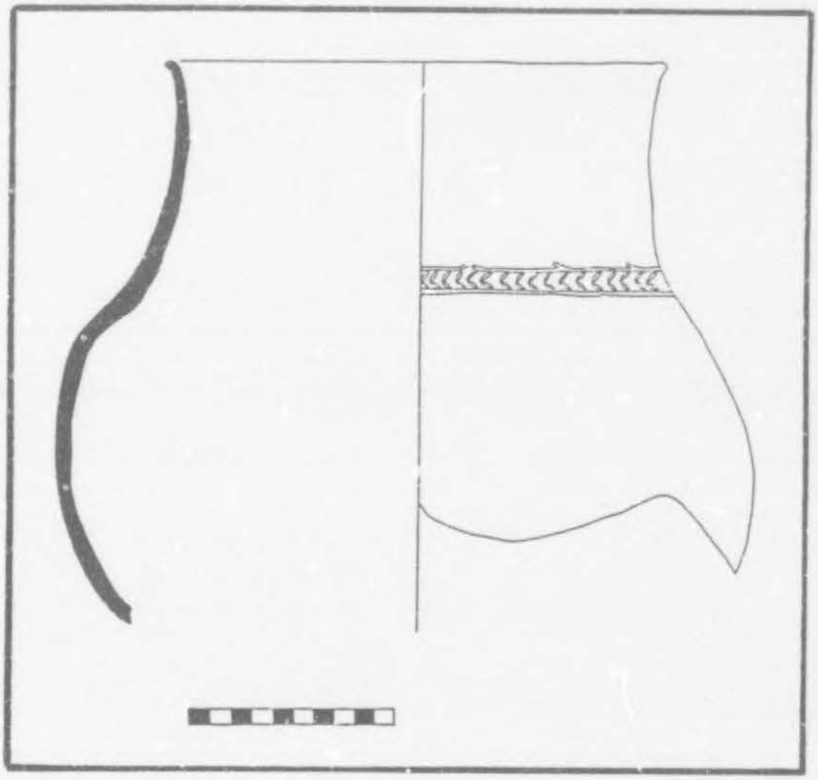


FIG. 15 NTSITSANA/NDONDONDWANE POT, SHERDS BELONGING TO THIS VESSEL WERE EXCAVATED FROM BOTH PITS 3 AND 6

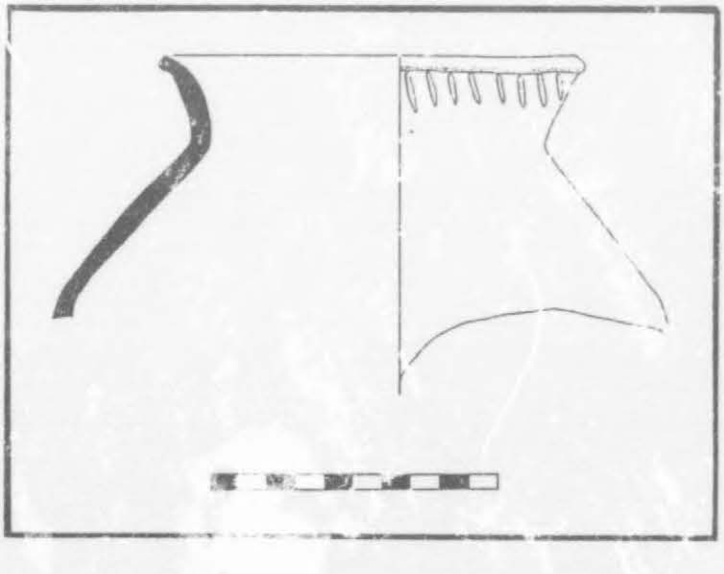


FIG. 16 POT EXCAVATED FROM PIT 8 (NTSITSANA/MSULUZI)

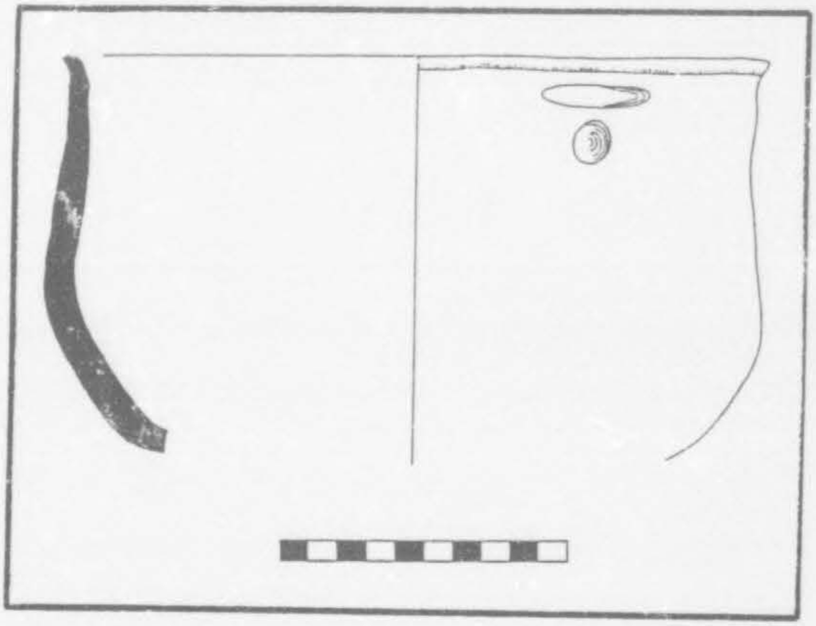


FIG. 17 HEMISPHERICAL BOWL WITH LUGS FROM PIT 6 (NTSITSANA/ NDONDONDWANE)

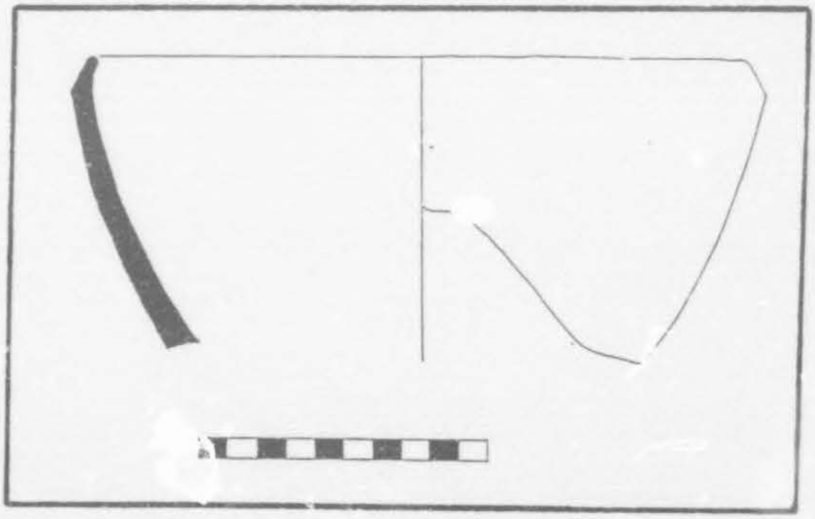


FIG. 18 SUBCARINATED BOWL, FROM PIT 3 (NTSITSANA/NDONDONDWANE)

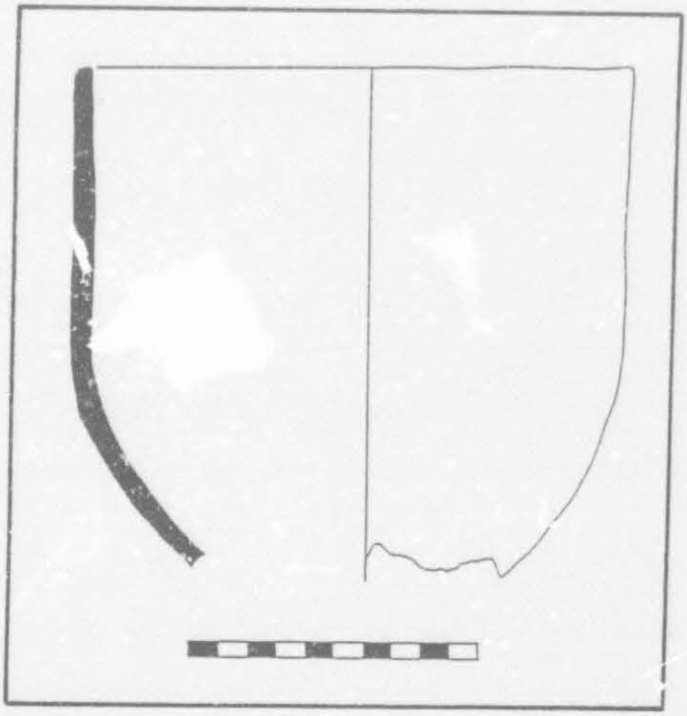


FIG. 19 DEEP STRAIGHT SIDED BOWL FROM PIT 3

(NTSITSANA/NDONDONDWANE)

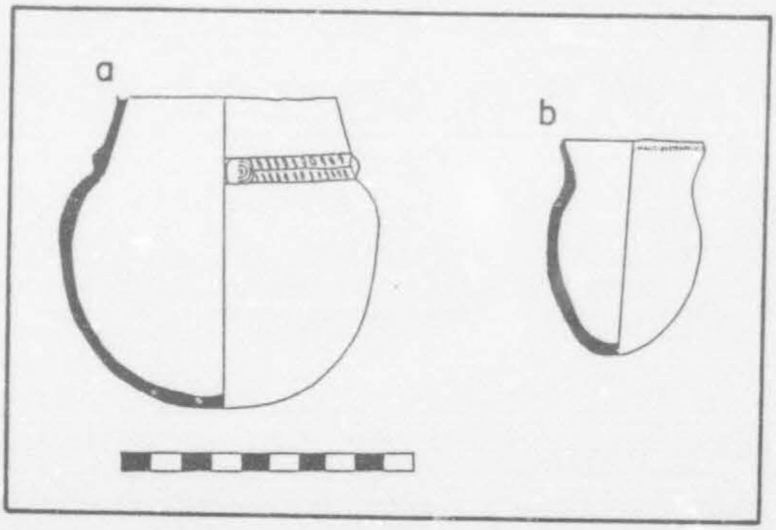


FIG. 20 SMALL VESSELS, PROBABLY TOY POTS FROM PIT 2

(NTSITSANA/NDONDONDWANE)

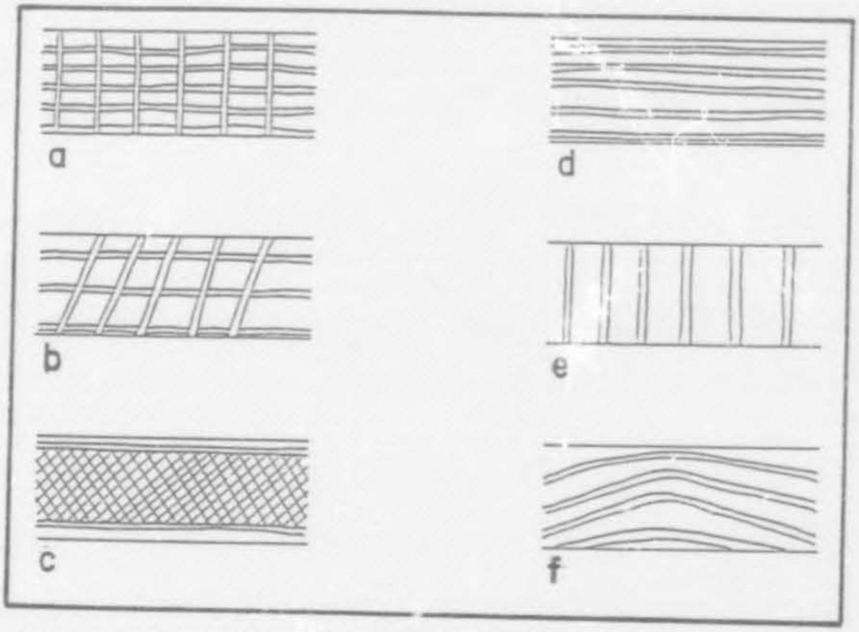


FIG. 21 DECORATION ON VESSELS

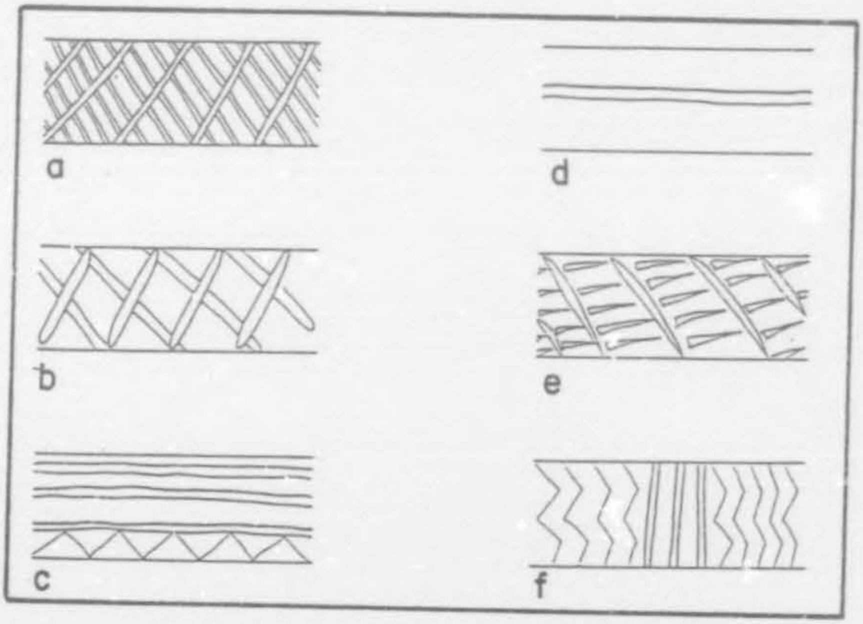


FIG. 22 DECORATION ON VESSELS

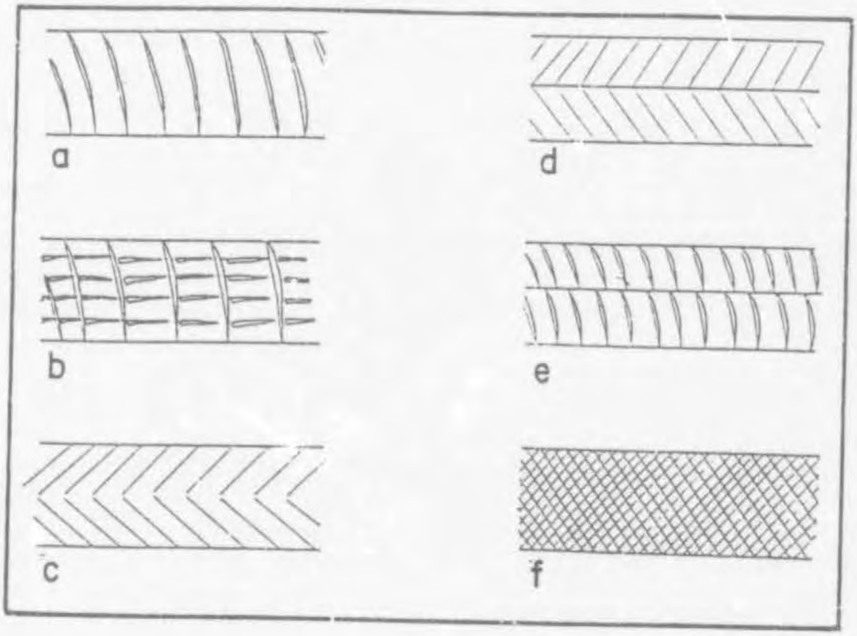


FIG. 23 DECORATION ON VESSELS

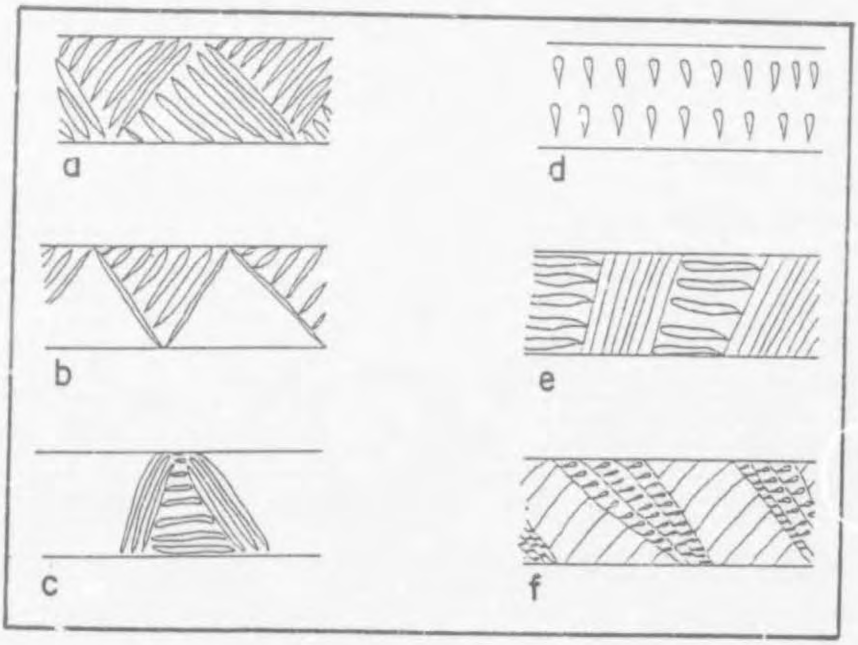


FIG. 24 DECORATION ON VESSELS

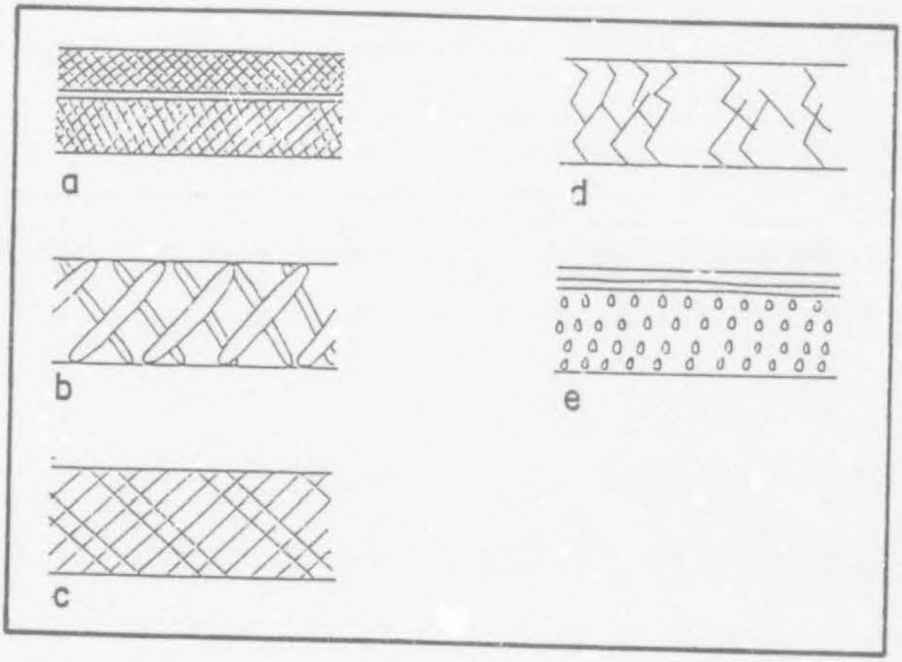


FIG. 25 DECORATION ON VESSELS

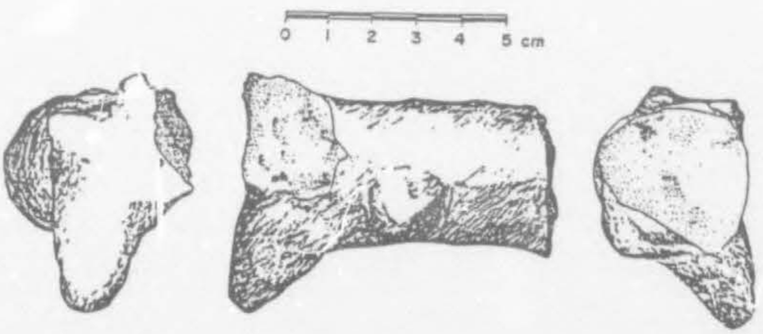


FIG. 26 FIGURINE RETRIEVED FROM PIT 1 (NTSITSANA/MSULUZI)

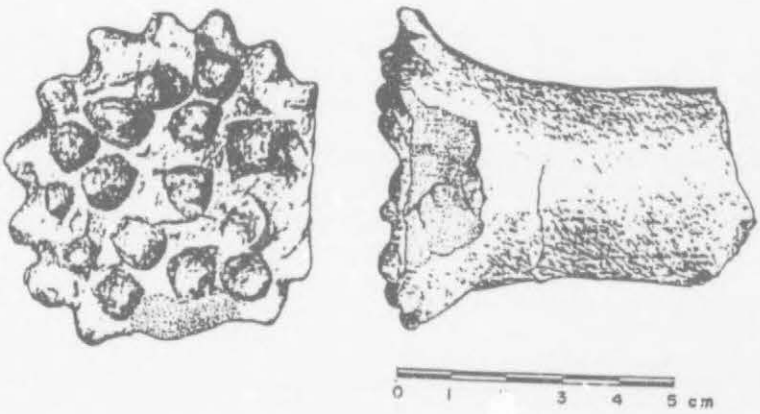


FIG. 27 FIGURINE RETRIEVED FROM PIT 2 (NTSITSANA/MSULUZI)

FIG. 28 FIGURINE SAMPLED FROM THE SURFACE AT NTSITSANA

Table 34. Ntsitsana/Msuluzi bowls, matrix of attributes. The column and row numbers refer to the list of characteristics. The number at the end of each row is the total for each characteristic

	7a	8a	9a	13a	44s	
7a		1	3	1		5
8a	1			1		2
44s			1			1
51s			1		1	2

The group includes incurved bowls (four) and deep straight sided bowls (two) with rather thick walls. Four lip profiles are flattened and two are rounded (Table 34). Both bowl types occur in association with Ntshekane type ceramics (9th century AD) in Natal (Maggs & Michael 1976). None of the typical Natal Msuluzi bowl types are present in the Ntsitsana/Msuluzi type assemblage.

No burnishing occurs on the Ntsitsana/Msuluzi pots or bowls though burnishing occurs on bowls of the Natal/Msuluzi assemblage. The larger proportion of the vessels have a well smoothed even but matte outer surface. As in the Natal/Msuluzi sample the inner surface is often noticeably rougher as if the pots had been scoured frequently during use (*vide* Maggs 1980c). Some vessels have been blackened from use on a fire.

THE NTSITSANA/NDONDONDWANE CERAMIC PHASE

Four of the excavated pits (2, 3, 5, & 6) contained pottery belonging to this phase. It is related to the Natal Ndondondwane assemblage (Maggs 1984a, Maggs & Ward 1984), both in time and typology. A total of 160 pots and 15 bowls were sufficiently complete for study. The attributes are given in Tables 35 & 36. It must be noted that there is some overlap in the attributes of the Ntsitsana/Msuluzi and Ntsitsana/Ndondondwane ceramics. Only one ceramic phase has been illustrated, in such cases, as an example.

Table 35. Characteristics of the Ntsitsana/Ndondondwane pots

Shape

2ab)	Pot with curved everted neck (Fig. 13)
3a)	Pot with upright neck (Fig. 15)
8a)	Lip profile rounded (Fig. 12a)
9a)	Lip profile flattened (Fig. 12b)
5a)	Neck-body junction (Maggs & Michael 1976)
5b)	Lip profile tapered (Fig. 12d)
12a)	Internal lip emphasis (Maggs & Michael 1976)
13a)	External lip emphasis (Fig. 12f)
31c)	Notches on lip (Fig. 12e)
57S)	Deep triangular notches on lip (variation of motif 12e)

Position of decoration

3b) Whole neck decorated (Fig. 13)
10b) Body-neck junction (Fig. 15)
11b) Just below body/neck junction
32b) Lower neck decoration (Fig. 14)

Decoration motifs

15b) Band of oblique hatching (Fig. 23a)
16b) Two or more bands of oblique hatching
17b) Band of horizontal and oblique or vertical crosshatching (Fig. 23b)
21a) Band of opposed hatching with intervening grooves (Fig. 23d)
22a) Band of opposed hatching with intervening grooves (23c)
23a) Band of hatching not opposed (Fig. 23e)
24a) Cord effect (Fig. 20)
25a) Band of even cross-hatching (Fig. 22a)
25c) Horizontal quadrilaterals-hatched
26a) Band or bands of uneven cross-hatching (Fig. 25a)
27a) Band of several horizontal grooves
30c) Miscellaneous decoration (Maggs 1980c)
33a) Applied decoration (Fig. 25e)
36a) Interruption by oblique grooves (Fig. 21b)
39a) Horizontal grooves on either side of band (Fig. 21c)
40S) Band(s) of even cross-hatching with intervening groove(s) (Fig. 25a)
42S) Bosses (Fig. 20a)
48S) Band(s) of vertical grooves (Fig. 21e)
50S) Even cross-hatching with emphasis on oblique hatching in one direction (Fig. 21b)
55S) Band of several horizontal grooves where the grooves are approx. 10-15 mm apart (21d)
57S) Deep triangular notches on lip (variation of 12e).
58S) Combination of even and uneven cross-hatching so as to form a pattern (Fig. 25c)
59S) Single horizontal groove
60S) Band of combined opposed and cross-hatching forming a vertically arranged zig-zag pattern (Fig. 25d)
64S) Horizontal (not always completely parallel) rows of impressions forming a band (Fig. 25e)

Table 36. Ntsitsana/Ndondondwane pots, matrix of attributes. The column and row numbers refer to the list of characteristics. The number at the end of each row is the total for each characteristic

	2ab	3a	5a	5b	8a	8b	9a	10c	11b	12a	13a	15b	16b	17b	21a	22a	23a	24a	25a	25c	26a	27a	31c	32b	39a	39s	40s	42s	58s	59s	60s	64s	
2ab			3	1	2	2	2	2			2	1			1		1				1	1			1	1					1	1	23
3a			101	9	6		58	64	1	1	15	4	1	1	11	1		4	19	1	5	8		13	1	10	3	1		65			403
5a		5		4	2		27	64	1	6	8	5		1	12	1	1	3	20	1	4	8		13	3	10	3	1		10			213
8	1	3	2	1		2	3	1			4	1									2	1											21
8b																					1	1											2
9a		26	5		2			19		1	26				6		1		3				1		1	1				8			111
10c												4	1	1	12		1	4	21	1	4	7		3	2	30	1			15			107
11b																		1									1						2
13a		5					1	6									1				1					1				3			18
15b																		2								1							3
21a												3						3							2	3							11
23a																										1							1
24a																									2	2							4
32b								9				3			3			3	8	1						3							30
39s												2	1					2															5
40s																		1								1							2

There is little variation in pot shapes (Table 35). The larger percentage (96%) falls in the category of "upright necked" vessels while the remainder have "curved everted necks." The Natal Ndondondwane sample differs in this regard in that most of the pots are "curved everted" but there is a significant number of "upright necks" (Maggs 1984a:80). Most of the vessel lip profiles are flattened but some "rounded and tapered lip profiles" also occur.

Fifty five percent of the Ntsitsana/Ndondondwane pots are undecorated. No undecorated pots are described from the Ndondondwane assemblage in Natal, but one undecorated pot with a fairly up right neck was found at Mhlopeni (Maggs & Ward 1984). The most characteristic decorated pots of the Ntsitsana assemblage have one band of decoration on the lower half of the neck ending at the body-neck junction, with a broad undecorated band above it (Fig. 15). This feature is much less common at Msuluzi Confluence and other sites in Natal (Maggs 1984a:30). Only 3% of the Ntsitsana/Msuluzi assemblage shows this feature and it is found only on pots with "curved everted" necks. Generally the decoration of the Ntsitsana/Ndondondwane pottery is much finer than that on the Ntsitsana/Msuluzi pottery, even though some of the motifs may be shared. Most common motifs of the Ntsitsana/Ndondondwane assemblage are; a band or bands of even cross hatching; horizontal grooves on either side of a band; a band of several horizontal grooves; a band of oblique hatching and a band of opposed hatching without intervening grooves. In this regard the sample is very similar to the Natal material in which the most common motifs are hatching and cross-hatching (Maggs 1984a:80). So called "cord effect" decoration, where the bands stand out in relief, is less significant as an attribute of this phase in Natal. Multiple bands covering most of the neck and typical of Msuluzi Confluence and Ntsitsana/Msuluzi-type ceramics do not occur though such decoration does occur in the Ndondondwane sample in Natal. Body decoration is absent in the Ntsitsana/Ndondondwane sample (Fig. 15), and rare at Ndondondwane in Natal. While no burnishing occurs on pots from the Ntsitsana/Msuluzi assemblage, it occurs in the Ntsitsana/Ndondondwane assemblage on pots as red ochre, black graphite, and uncoloured burnish. The bowls are described in Table 37.

Table 37. Characteristics of the Ntsitsana/ Ndondondwane bowls

---

<u>Shape</u>

1a)	Neck inward sloping (Fig. 20a)
7a)	Incurved bowl (Lawton 1967)
8a)	Lip profile rounded (Fig. 12a)
9a)	Lip profile flattened (Fig. 12b)
5b)	Lip profile tapered (Fig. 12d)
42S)	Applied decoration - bosses or lugs (Fig. 20a)
44S)	Deep straight sided bowl with rather thick walls, slightly inward sloping (Fig. 19)
62S)	Hemispherical bowl (Fig. 17)
63S)	Bowl subcarrinated just below lip, the angle of carrination being 12 mm less below the lip (Fig. 18)

Table 38. Ntsitsana/Ndondondwane bowls, matrix of attributes. The column and row numbers refer to the list of characteristics. The number at the end of each row is the total for each characteristic

	1a	5b	7a	8a	9a	42s	
1a			1	1	1		3
5b						2	2
7a				4	6		10
44s					1		1
62s		2				2	4
63s	1		1			1	

Only 15 bowls were recovered from the pits which again reflects a low ratio of bowls to pots. This group includes incurved bowls (nine). Also present were bowls subcarrinated just below the lip (three), hemispherical bowls (two), and one deep straight sided bowl with rather thick walls that are slightly inward sloping. Incurved bowls have both flattened and rounded lips. The deep straight sided bowl has a flattened lip, while the lips of the hemispherical bowls are tapered, and those of the subcarrinated bowls, are rounded. One subcarrinated and one hemispherical bowl have bosses. With the exception of bosses (Fig. 20) no decoration or burnish occurs on any of the bowls. Hemispherical bowls were also recorded on the Ndondondwane site in Natal, whilst incurved bowls, subcarrinated bowls of category 63S, and deep straight sided bowls have been recorded only from the Ntshekane site in Natal (Maggs & Michael 1976). Incurved bowls and deep straight sided bowls occur also in the Ntsitsana/Msuluzi-type assemblage.

As at Ndondondwane in Natal and Broederstroom in the Transvaal (Mason 1981), there are a few examples of very small vessels (Fig. 20a & b). These have been interpreted in functional terms as toy pots (Maggs 1984a:85) but they may have greater cultural significance. One of these small pots has an inward sloping neck, an attribute typical of ninth century AD Ntshekane vessels in Natal (Maggs & Michael 1976).

Most of these vessels have been blackened by fire. The inside of a complete pot from Pit 6, was smeared with red ochre. Some pots were used for collecting or storing ochre and there are pieces of red ochre in the pit fill. The nearest source of red ochre is at Dumsi location about 8 km from Ntsitsana. A number of the pits contained nearly complete pots discarded or buried, usually with their bases broken prior to burial. Ntsitsana is the southernmost Early Iron Age occurrence yet recorded of the practice of ritually breaking pots. Potsherds belonging to the same vessel were recovered from two separate pits (3 & 6) suggesting that some of the pits were filled contemporaneously.

DISCUSSION

The typology of the pottery from Ntsitsana is easily related to the typology of contemporaneous sites in Natal. There are some local differences and it is possible to make the following broad distinctions between the Natal and the Transkei assemblages.

a) Bowls are more common at the Natal sites than at Ntsitsana.

b) The vessels from Ntsitsana are smaller. They range in diameter from 40–240 mm as opposed to 80–400 mm for the Natal samples (Maggs & Michael 1976; Maggs 1980c).

c) The transition from the Ntsitsana/Msuluzi to the Ntsitsana/Ndondondwane phase appears to be more abrupt in the Transkei sequence than is the equivalent change in Natal.

d) The Ntsitsana/Msuluzi and especially the Ntsitsana/Ndondondwane assemblages include decorative elements more characteristic of the later Ntshekane ceramic phase in Natal. This may be more significant than simply idiosyncratic variability but larger scale research would be necessary to investigate such patterning in time and space.

The Natal and Transkei samples are not only typologically similar but they can be related to the larger unit, the "Lydenburg Tradition" (Hall 1987b) or "Lydenburg facies" (Evers 1989). This facies has a distribution that includes the eastern and western Transvaal and large parts of Natal. Mpame (Cronin 1982) and Lujojozi (Robey 1985; Robey & Feely

1987) are other sites in the southern Transkei known to relate to this facies.

FIGURINES

A blackened figurine fragment was recovered from Pit 1 in association with Ntsitsana/Msuluzi pottery (Fig. 26). This figurine shows striking similarities to clay human figurines, made as toys by Mpondomise girls (Shaw & Van Warmelo 1988:853). Pit 2 yielded a further solid figurine fragment in association with Ntsitsana/Ndondondwane pottery (Fig. 27). The figurine is burnished with graphite, and may be the lower portion of a human figure. Although the figurines belong to two different periods, they are of approximately the same size, and were broken at the same ends. The upper portions are missing,as if the figurine was broken in two, whilst stick impressions are found on the broken surface. Both figurines also have a distinctive gap at the bottom. Broken figurines are known from other first millennium farming sites (Inskeep & Maggs 1975). Breakage may be ritual and human figurines suggest an association with initiation.

Other distinctive items were collected from the surface of the site. These include two ceramic spoon-like objects, similar to those found at Msuluzi Confluence in Natal (Maggs 1980b:132), a clay disc with a hole made through the middle and two human figurine fragments, one (Fig. 28) showing the same decoration as a figurine recovered from the Mhlopeni site in Natal (Maggs & Ward 1984:130). In addition there were four animal figurine fragments, represented by the front portion of the animal. The lower body of the animal, including the hind legs, was apparently deliberately broken. Stick impressions in the clay, approximately where the lower part of the figurine is missing, suggest that they were originally mounted on sticks. The identification of the animals is uncertain, although one is probably a representation of an ox. Four clay horns also belong to the sample. Finally there are amorphous baked clay protrusions that could either be classified in this category, or even as the remains of pots.

The presence of ceramic sculptures at Ntsitsana, as at other first millennium farming sites in southern Africa (Inskeep & Maggs 1975; Maggs & Michael 1976; Evers 1982; Maggs 1980a, 1984a; Maggs & Ward 1984; Mason 1986) is further support for a wide spread and shared system of symbols and beliefs. However, the exact nature of this system still needs to be indicated.

SUMMARY

Two ceramic types or phases have been identified at Ntsitsana. These have been termed the Ntsitsana/Msuluzi and the Ntsitsana/Ndondondwane ceramic phases. The phases are time successive (Ntsitsana/Msuluzi c. AD 660, Ntsitsana/Ndondondwane c. AD 770) and the dating is similar to typologically related ceramics in Natal. The Transkei pottery samples show sufficient differences from the Natal samples to merit some typological distinction. However, they belong to the same larger unit the "Lydenburg facies" and thus there is a link with early farming communities not only in Natal but also in Transvaal. This wider geographical relationship is supported by the occurrence of ritually broken pots and figurines at Ntsitsana and elsewhere in southern Africa.

APPENDIX 2

ANALYSIS OF FERRICRETE AND SLAG OBTAINED FROM NTSITSANA

Feely (1985) suggested that ferricretes (diagnostic hard plinthite, ironpan, ngubane, ouklip, laterite hardpan) (Van der Walt & van Rooyen 1990) were probably used as the ore for iron smelting during the Iron Age in Transkei. No other iron ores occur in any quantity. Two pieces of slag and ferricrete from Ntsitsana were analysed (semi-quantitative X-ray fluorescence) by Bergstrom & Bakker, Instrumental Chemical Analysts, Johannesburg. The results are given in Tables 39 and 40.

The chemical composition of slag and ore has been used in sourcing experiments in Iron Age investigations, notably by Friede et al. (1982). The scale of this study did not justify the quantitative analysis of trace element ratios (Table 39). The main constituents of the slag are very similar to those in the local ferricrete and it is very probable that ferricrete was the ore source (Table 40). There are minor anomalies that are explicable.

The high value for CaO in the slag (3.56%) relative to the ferricrete 0.66% can be explained by either the use of a lime flux, or the absorption of lime from the charcoal fuel. The higher silicon dioxide (SiO_2) content of the slag (17%) relative to the ferricrete (12%) indicates either the addition of sand or crushed quartzite as flux, or the absorption of silica from a grass bed at the furnace bottom (Friede et al. 1982). The higher percent age of P_2O_5 in the ferricrete relative to the slag suggests that P_2O_5 was sublimated during the smelting process. The discrepancies in the MnO and Al_2O_3 values are less readily explained in detail but could relate to effects of the smelting process as well. The nearly identical values for Fe_2O_3 and the similar percentage for the remaining major constituents (Table 40) and the minor constituents (Table 39) support the suggestion that local ferricrete was used for iron smelting.

Table 39. Minor constituents in the slag and ferricrete from Ntsitsana, expressed as parts per million. * Indicates trace element levels are above L.L.D. for scans

Constituent	Ferricrete	Slag
	ppm	ppm
Ce	15	2
La	16	50 *
Sc	5	25
Ba	307 *	286 *
Cs	4	7
Te	18	1
Sb	6	1
Sn	22	22
Cd	4	1
Ag	1	1
Mo	18	21 *
Nb	1	0
Zr	49 *	60 *
Y	18	21 *
Sr	59 *	204 *
U	38 *	18
Rb	21 *	17
Th	17	1
Pb	70 *	2
Br	10	6
As	121 *	38 *
Se	24 *	0
Bi	13	1
Ge	0	4
Ga	7	17
Zn	41 *	1
W	5	9
Ta	6	2
Cu	42 *	129 *
Hf	1	29
Ni	47 *	39 *
Co	5	1

Table 40. Main constituents in slag and ferricrete obtained at Ntsitsana expressed as a percentage

Constituent	Ferricrete Percentage %	Slag Percentage %
Fe_2O_3	62,00	63,00
MnO	,02	,12
V_2O_5	,07	,06
Cr_2O_3	,08	,03
TiO_2	,46	,32
CaO	,66	3,56
K_2O	,54	,72
Cl	,00	,04
S	,06	,10
P_2O_5	,23	,11
SiO_2	12,00	17,00
Al_2O_3	7,84	2,85
MgO	,20	,37
Na_2O	,01	,18
Total	85,54	88,85

APPENDIX 3

LIST OF WOODY SPECIES IDENTIFIED IN STUDY AREA

Aloe bainesii
A. ferox
Acacia caffra
A. karroo
A. robusta
Acokanthera oblongifolia
Adenopodia spicata
Apodytes dimidiata
Azima tetracantha
Bauhinia natalensis
Boscia albitrunca
Brachylaena ilicifolia
Buddleia saligna
Cadaba natalensis
Calpurnia aurea
Canthium inerme
Capparis tomentosa
Carissa bispinosa
Cassine aethiopica
Celtis africana
Chaetacme aristata
Clerodendrum glabrum
Coddia rudis
Combretum erythrophyllum
Cussonia paniculata
C. spicata
Dalbergia obovata
Derris trifoliata
Diospyros dichrophylla
D. lycioides
Dovyalis cafira
Ehretia rigida
Erianthemum dregei
Euclea undulata
Euphorbia curvirama
E. tirucalli
E. triangularis
Ficus ingens var. *ingens*
F. sur
F. thoningii
Harpephyllum caffrum
Hippobromus pauciflorus
Homalium dentatum
Kiggelaria africana
Lycium oxycarpum
Maerua caffra
Maytenus heterophylla
M. nemerosa
M. nervosa
M. peduncularis
Olea europaea subsp. *africana*
Pappea capensis
Pavetta lanceolata
Pittosporum viridiflorum
Plumbago auriculata
Protaspagus divaricatus
P. macowanii
Ptaeroxylon obliquum
Rhoicissus tomentosa
Rhus rehmanniana
R. tomentosa
Schotia brachypetala
Senecio pterophorus
Sideroxylon inerme
Solanum tomentosum
Tarchonanthus camphoratus
Trichilia emetica
Vepris undulata
Ziziphus mucronata

APPENDIX 4

DESCRIPTION OF THE ATTRIBUTES USED TO DEFINE TAXONOMIC TYPES IN THE CHARCOAL ANALYSIS

Type 1 *Acacia caffra* (Fig. 29.1)

Large solitary vessels; occasionally smaller vessels forming short radial groups around a larger vessel; vessels with simple perforation plates; axial parenchyma vasicentric, aliform to confluent; relatively thick walled fibres in tangential bands; multiseriate rays, 2–5 seriate.

Type 2 *Acacia karroo/robusta* (Fig. 29.2)

Large solitary vessels; occasionally smaller vessels form a cluster around a larger vessel; vessels with simple perforation plates; axial parenchyma strongly vasicentric, aliform to confluent; relatively thick walled fibres in tangential bands; multiseriate rays, 7–12 seriate.

Type 3 *Adenopodia spicata* (Fig. 29.3)

Solitary vessels of different sizes forming tangential chains; vessels with simple perforation plates; parenchyma apotracheal diffuse in aggregates; thin to thick walled fibres; multiseriate rays, 5–12 seriate.

Type 4 *Apodytes dimidiata* (Fig. 29.4)

Small solitary vessels, sometimes forming irregular clusters; vessels with scalariform perforation plates; parenchyma apotracheal and diffuse, sometimes occurring in small groups of two cells; fibres thin; rays, 1–3 seriate.

Type 5 *Bauhinia natalensis* / *Coddia rudis* (Fig. 29.5)

Small solitary vessels, sometimes forming tangential chains; vessels with single perforation plates; parenchyma apotracheal and sparse; fibres thick to very thick; rays, 1–4 seriate and parallel sided.

Type 6 *Boscia albitrunca* (Fig. 29.6)

Vessels solitary and long radial multiples of 4 cells and more; vessel perforation plates simple; parenchyma scanty paratracheal, sometimes vasicentric; fibres thick; rays, 1–4 seriate.

Type 7 *Buddleia saligna* (Fig. 29.7)

Medium sized vessels in long radial multiples up to seven cells long, but also solitary and arranged in tangential chains; vessels with simple perforation plates; parenchyma paratracheal vasicentric; very thin to thin walled fibres; rays, 3–10 seriate.

Type 8 *Cadaba natalensis* (Fig. 29.8)

Solitary vessels, different diameters; perforation plates exclusively simple; parenchyma sparse; thick to very thick walled fibres; rays, 3–4 seriate.

Type 9 *Calpurnia aurea* (Fig. 29.9)

Vessels in irregular clusters, sometimes solitary; vessels with single perforation plates; parenchyma reticulate forming long radial bands; very thick walled fibres; rays, 5–12 seriate.

Type 10 *Cassine aethiopica* (Fig. 29.10)

Minute (very small) solitary vessels forming irregular clusters; vessel perforation plates scalariform; parenchyma sparse, although bands of 1–4 cells wide occur; fibres thin walled; rays, uniseriate to 3 seriate.

Type 11 *Celtis africana* (Fig. 29.11)

Large solitary vessels; vessel perforation plates exclusively simple; paratracheal parenchyma, vasicentric and aliform confluent; thin walled fibres; rays, 6–11 seriate.

Type 12 *Clerodendrum glabrum* (Fig. 29.12)

Vessels occuring in short radial multiples, 2–4 cells wide, sometimes forming irregular clusters; vessel perforation plates exclusively simple; scanty parenchyma; thin walled fibres; rays, 4–6 seriate.

Type 13 *Combretum erythrophyllum* (Fig. 29.13)

Large solitary vessels; vessel perforation plates exclusively simple; parenchyma paratracheal vasicentric to aliform confluent and banded; thin walled fibres; rays, 2–12 seriate.

Type 14 *Cussonia* sp. (Fig. 29.14)

Small solitary vessels, arranged in short radial multiples; vessel perforation plates–scalariform; parenchyma scanty paratracheal; thin walled fibres; rays, 3–8 seriate.

Type 15 *Dalbergia obovata* (Fig. 29.15)

Vessels solitary and short tangential chains; vessel perforation plates exclusively simple; parenchyma paratracheal, some vasicentric; very thin walled fibres; rays 2–5 seriate.

Type 16 *Diospyros* spp./Euclea undulata (Fig. 29.16)

Small vessels, generally in short radial multiples, some solitary; vessel perforation plates simple; parenchyma apotracheal–sparse or diffuse; fibres thin walled; rays lens shaped, where 2–3 seriate, parallel sided where uniseriate.

Type 17 *Dovyalis caffra* (Fig. 29.17)

Vessels generally in short radial multiples, some solitary; vessel perforation plates single; parenchyma scanty; fibres very thin walled; rays 3–4 seriate.

Type 18 *Ehretia rigida* (Fig. 29. 18)

Small solitary and irregularly clustered vessels; vessels with single perforation plates; parenchyma apotracheal–sparse or diffuse; fibres thick walled; rays lens shaped, 2–3 seriate.

Type 19 *Euphorbia tirucalli* (Fig. 29.19)

Small solitary vessels; vessel perforation plates exclusively simple; parenchyma scanty, some paratracheal vasicentric; uniseriate rays.

Type 20 *Hippobromus pauciflorus* (Fig. 29.20)

Small solitary vessels, and larger vessels arranged in tangential chains; vessel perforation plates exclusively simple; parenchyma scanty; fibres very thin walled; rays, 5–14 seriate.

Type 21 *Kiggelaria africana* (Fig. 29.21)

Vessels predominantly solitary, but some short radial multiples; vessels with simple perforation plates; parenchyma absent; fibres septated and thick walled; rays, 3–6 seriate.

Type 22 *Maytenus spp.* (Fig. 29.22)

Medium to small sized solitary vessels; axial parenchyma apotracheal, tangentially banded and four cells or more wide; vessel perforation plates simple; thick walled fibres; rays are biseriate or 3–4 seriate.

Type 23 *Olea europaea* (Fig. 29.23)

Medium sized vessels in short radial multiples with some solitary vessels and radial clusters; vessel perforation plates exclusively simple; very thick walled fibres; parenchyma scanty paratracheal; rays generally biseriate.

Type 24 *Pappea capensis* (Fig. 29.24)

Large to medium solitary vessels; forming small irregular clusters; vessel perforation plates single; parenchyma scanty, some are paratracheal vasicentric; very thick walled fibres; rays 5–10 seriate.

Type 25 *Protasparagus divaricatus/macowanni* (Fig. 29.25)

Medium sized vessels forming halter-like clusters; vessel perforation plates single; parenchyma vasicentric paratracheal; fibres are thin to thick walled, no rays observed.

Type 26 *Ptaeroxylon obliquum* (Fig. 29.26)

Medium to small sized vessels in long and short radial multiples, and some solitary vessels; vessel perforation plates exclusively simple; parenchyma apotracheal, concentric long bands 1–2 cells wide; fibre walls very thick; uniseriate rays.

Type 27 *Rhoicissus tomentosa* (Fig. 29.27)

Large oval solitary and radially arranged vessels; vessel perforation plates; parenchyma paratracheal aliform--confluent; fibres thin walled; rays, 7–10 seriate.

Type 28 *Rhus* spp. (Fig. 29.28)

Medium to large, mostly solitary vessels, also occasional short radial multiples; vessel perforation plates simple; fibres very thin walled; parenchyma scanty vasicen[illegible]; resin canals almost always visible in tangential section; rays, 1–6 seriate.

Type 29 *Schotia brachypetala* (Fig. 29.29)

Medium to large solitary and irregular clustered vessels; vessel perforation plates exclusively simple; parenchyma paratracheal, aliform confluent and banded; fibres thin to thick walled; rays, 1–4 seriate, short lens shaped in tangential section.

Type 30 *Sideroxylon inerme/Lycium oxycarpum.* (Fig. 29.30)

Vessel size ranges from small to large; irregular clusters; vessel perforation plates exclusively simple; parenchyma paratracheal scanty, some are vasicentric and reticulate; fibres range from thin to very thick; rays 4–10 seriate; tall lens shaped in tangential section.

Type 31 *Tarchonanthus camphoratus* (Fig. 29.31)

Vessels small to medium sized solitary and short radial multiples, some are grouped in irregular clusters in not more than 5 cells; vessel perforation plates exclusively simple; parenchyma scanty vasicentric; fibres very thick walled; rays, 2–3 seriate.

Type 32 *Trichilia emetica* (Fig. 29.32)

Medium to large vessels, arranged in short to long radial multiples (± 4 cells); vessel perforation plates exclusively simple; parenchyma paratracheal scanty, some are aliform confluent; fibres thin to thick walled; rays, 1–2 seriate.

Type 33 *Vepris undulata* (Fig. 29.33)

Small to medium vessels, short radial multiples and solitary; vessel perforation plates exclusively simple; parenchyma apotracheal–concentric long bands, 2–4 cells wide; fibres thick to very thick walls; rays, 1–4 seriate.

Type 34 *Ziziphus mucronata* (Fig. 29.34)

Medium to large vessels, solitary and short radial multiples; vessel perforation plates exclusively simple; parenchyma scanty, sometimes paratracheal vasicentric and aliform; fibres thick walled; uniseriate rays.

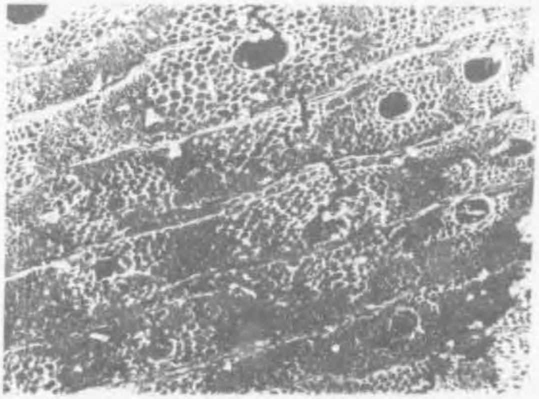


FIG. 29.1 *Acacia caffra* CS 50X

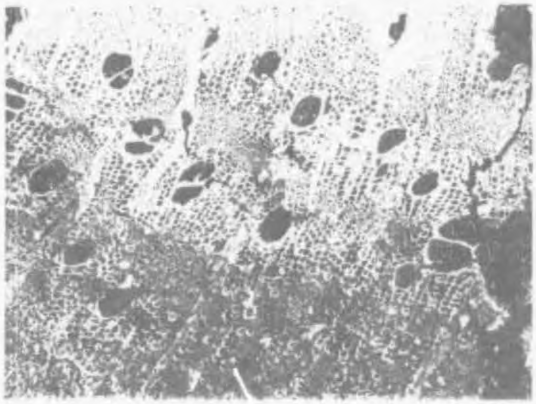


FIG. 29.2 *Acacia karroo* CS 50X

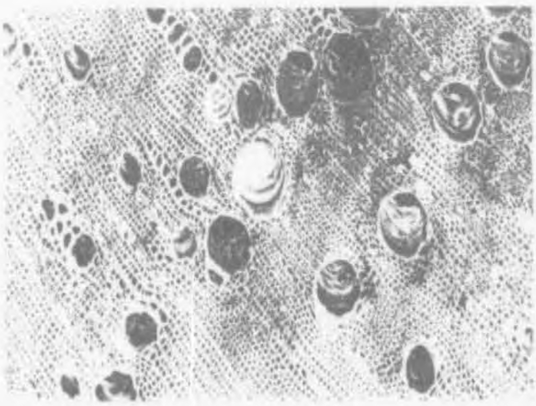


FIG. 29.3 *Adenopodia spicata* CS 50X

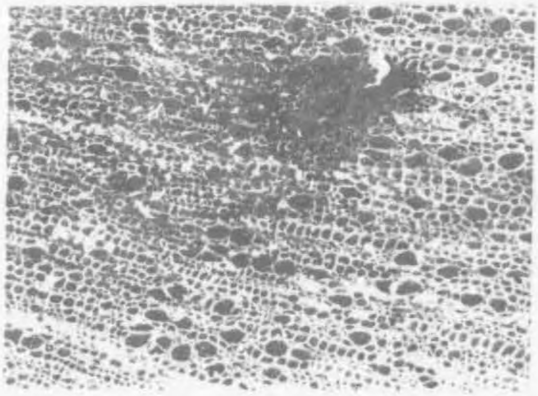


FIG. 29.4 *Apodytes dimidiata* CS 50X

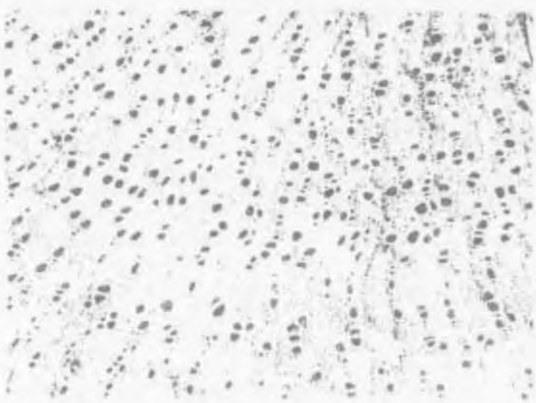


FIG. 29.5 *Bauhinia natalensis* CS 50X

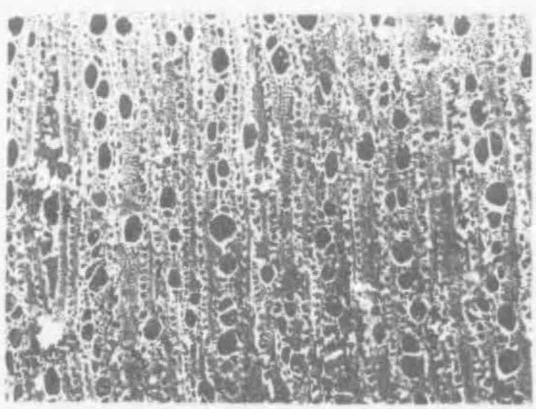


FIG. 29.6 *Boscia albitrunca* CS 50X

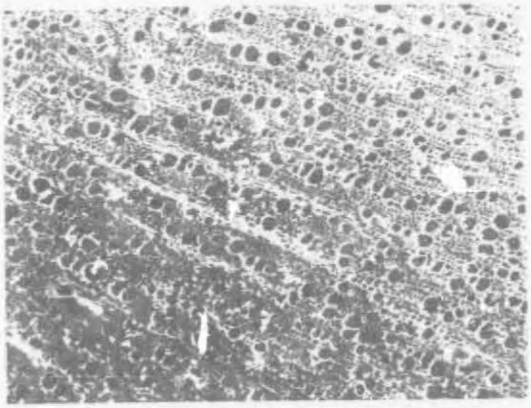


FIG. 29.7 *Buddleia saligna* CS 50X

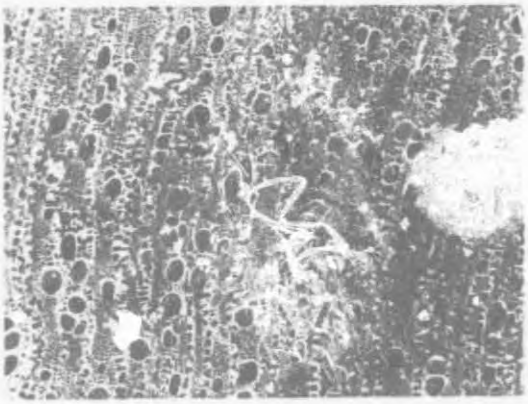


FIG. 29.8 *Cadaba natalensis* CS 50X

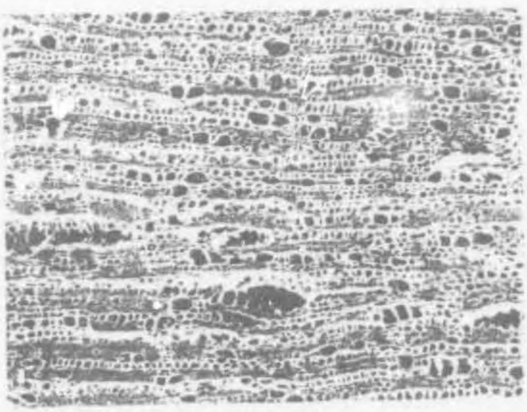


FIG. 29.9 *Calpurnia aurea* CS 50X

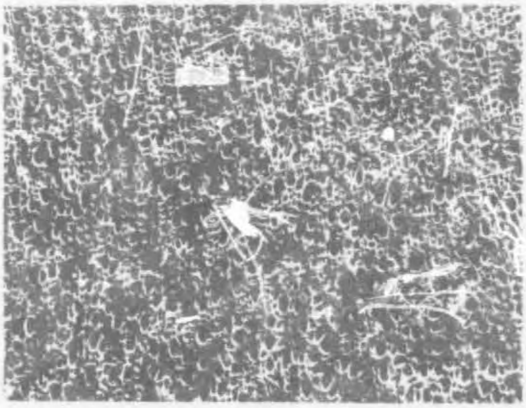


FIG. 29.10 *Cassine aethiopica* CS 50X

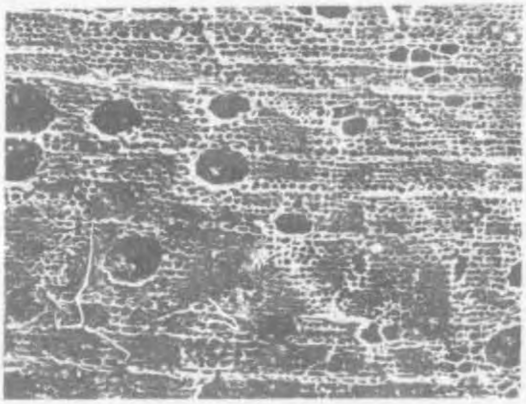


FIG. 29.11 *Celtis africana* CS 50X

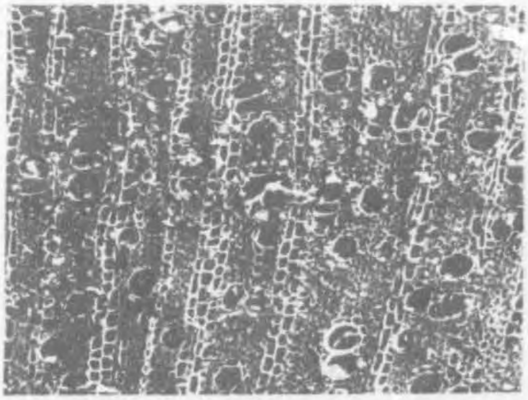


FIG. 29.12 *Clerodendrum glabrum* CS 50X

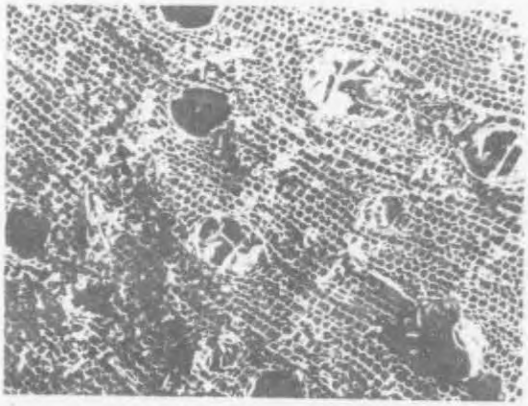


FIG. 29.13 *Combretum erythrophyllum* CS 50X

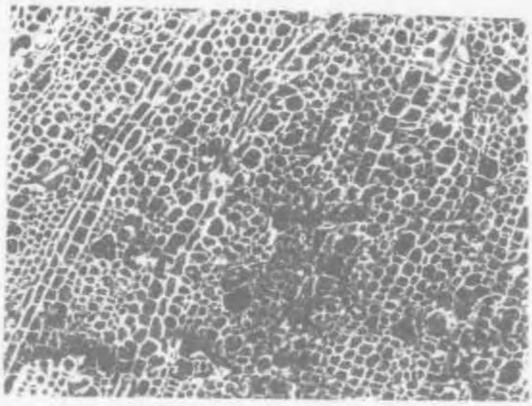


FIG. 29.14 *Cussonia* sp. CS 50X

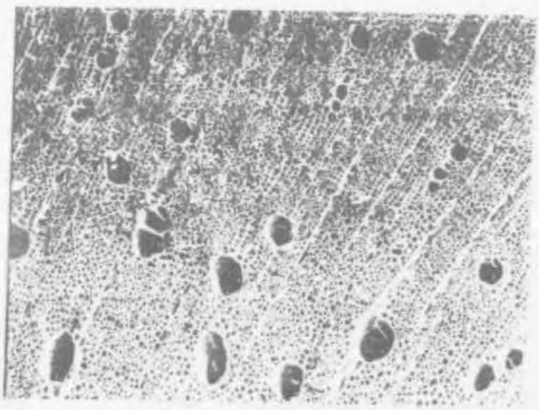


FIG. 29.15 *Dalbergia obovata* CS 50X

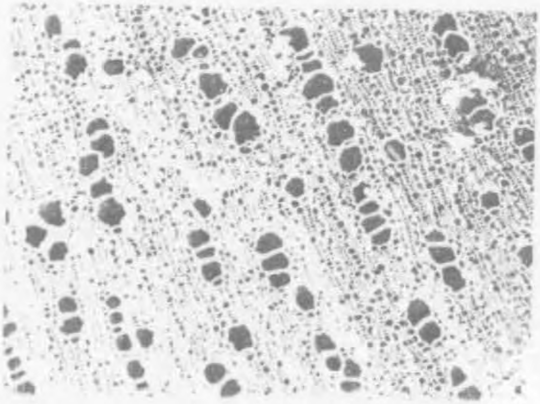


FIG. 29.16 *Diospyros* spp. CS 50X

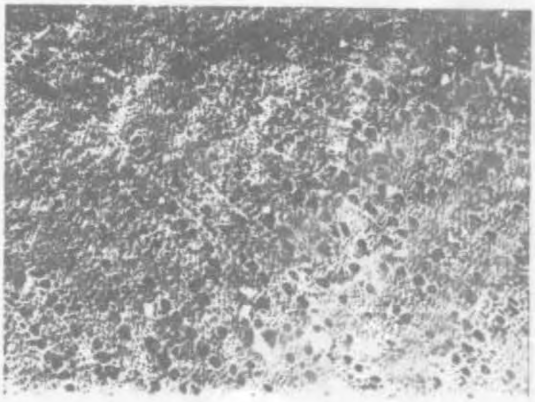


FIG. 29.17 *Dovyalis caffra* CS 50X

FIG. 29.18 *Ehretia rigida* CS 50X

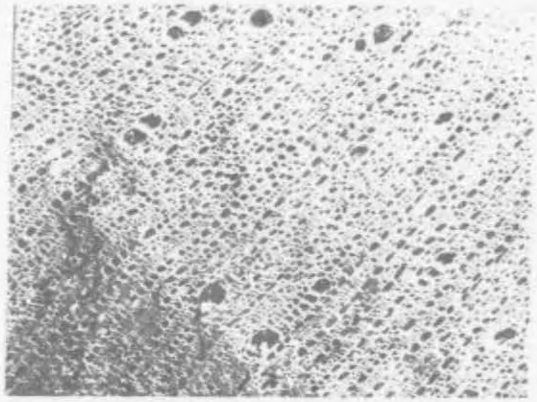


FIG. 29.19 *Euphorbia tirucalli* CS 50X

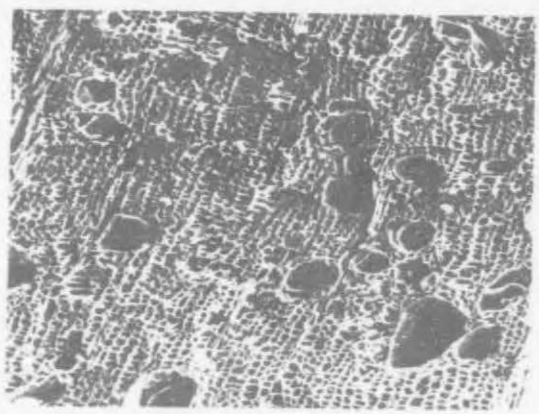


FIG. 29.20 *Hippobromus pauciflorus* CS 50X

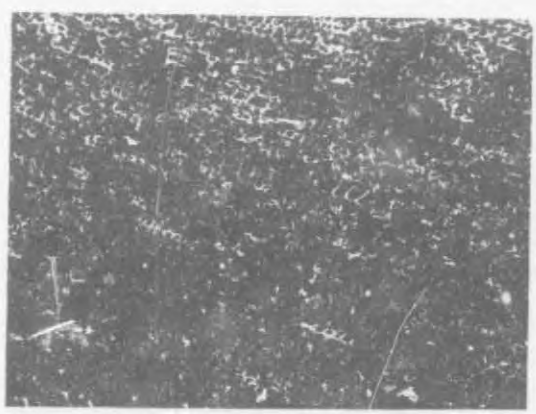


FIG. 29.21 *Kiggelaria africana* CS 50X

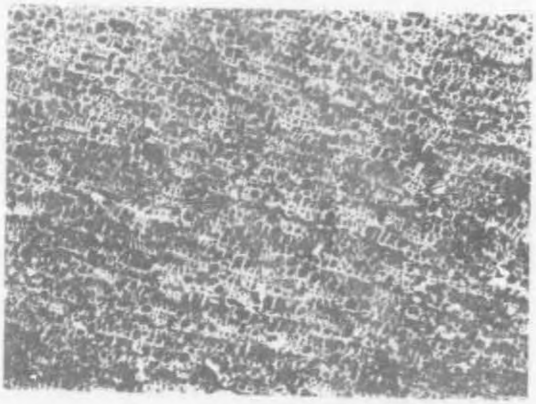


FIG. 29.22 *Maytenus* sp. CS 50X

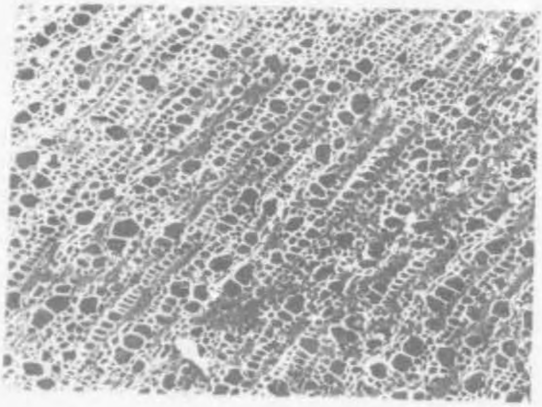


FIG. 29.23 *Olea europaea* CS 50X

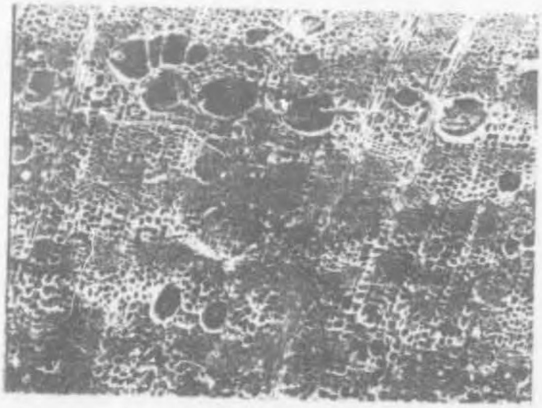


FIG. 29.24 *Pappea capensis* CS 50X

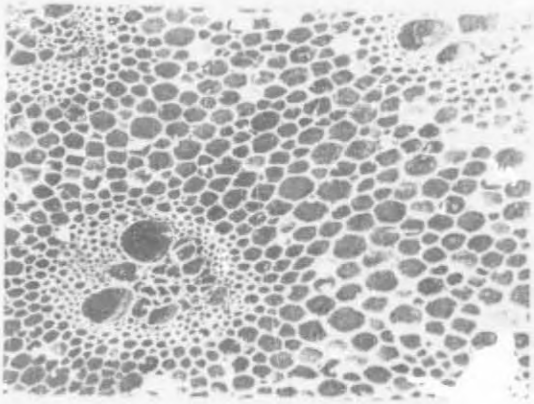


FIG. 29.25 *Protasparagus divaricatus* CS 50X

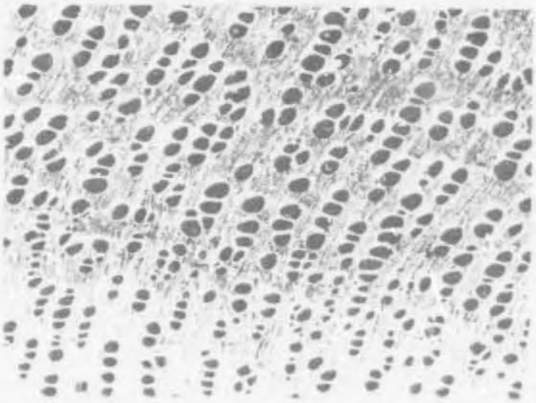


FIG. 29.26 *Ptaeroxylon obliquum* CS 50X

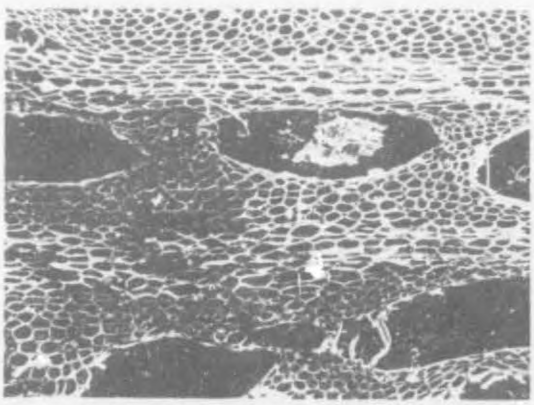


FIG. 29.27 *Rhoicissus tomentosa* CS 50X

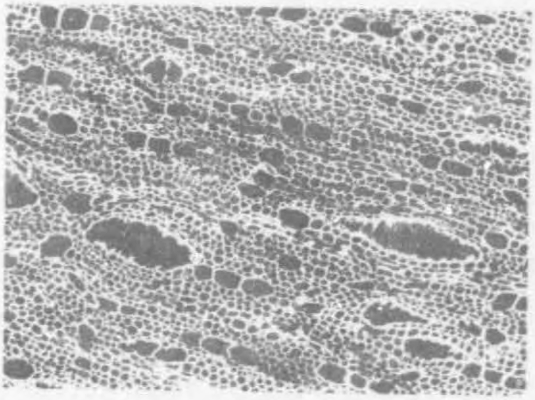


FIG. 29.28 *Rhus* sp. CS 50X

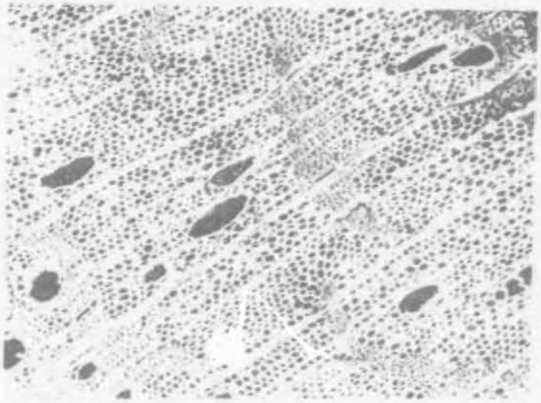


FIG. 29.29 *Schotia brachypetala* CS 50X

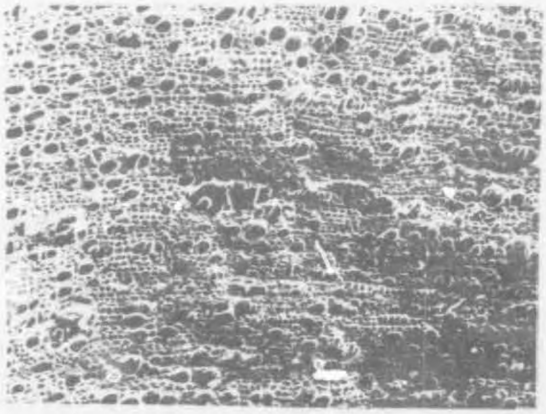


FIG. 29.30 *Sideroxylon inerme* CS 50X

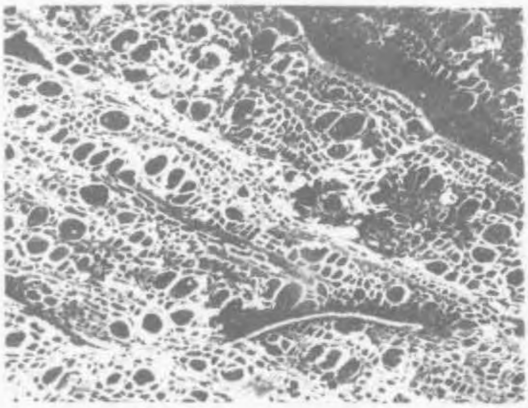


FIG. 29.31 *Tarchonanthus camphoratus* CS 50X

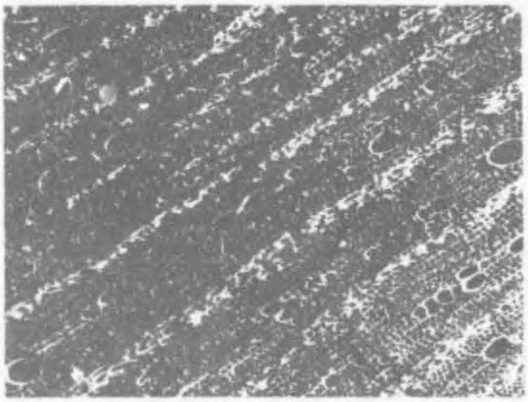


FIG. 29.32 *Trichilia emetica* CS 50X

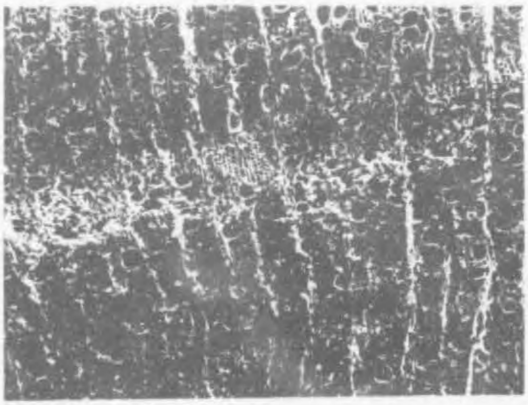


FIG. 29.33 *Vepris undulata* CS 50X

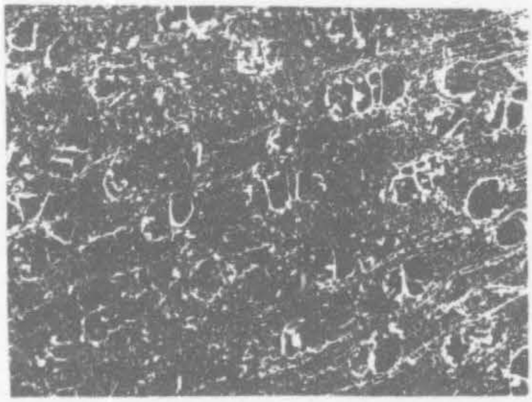


FIG. 29.34 *Ziziphus mucronata* CS 50X

APPENDIX 5

A PRELIMINARY INVESTIGATION OF THE POLLEN CONTENT OF ARCHAEOLOGICAL SOIL SAMPLES

Soil samples from all the excavated features at Ntsitsana were analysed for pollen. Only one sample from Pit 6 yielded any pollen. Dr L Scott of the Department of Botany, University of the Orange Free State undertook the analysis. He reported as follows:

" Three soil samples obtained from Pit 6 were treated in order to isolate pollen material. Although the samples have a high percentage of organic material the pollen concentration is low. Pollen belonging to *Pinus*, *Acacia*, Compositae, Chenopodiaceae and grasses were observed together with some fern spores. The presence of exotic pine pollen in all three soil samples indicates that they are contaminated with modern material. This evidence suggests that the meaningful analysis of the Ntsitsana pollen material would be uncertain. A logical first step would be to obtain uncontaminated material but such material could contain no pollen. Although a certain proportion of the pollen may well be <u>in situ</u> the concentration is so low that analyses would be complicated and time consuming. "

The results did not warrant further palynological study of the deposit.

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